VODAFONE NEW ZEALAND LIMITED

SUBMISSION TO THE NEW ZEALAND COMMERCE COMMISSION

on

PROCESS PAPER AND DRAFT PRICING REVIEW DETERMINATIONS FOR CHORUS' UNBUNDLED COPPER LOCAL LOOP AND UNBUNDLED BITSTREAM ACCESS SERVICES

and

COMMENTS ON ANALYSYS-MASON'S TSLRIC MODELS

Public version

20 February 2015

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Executive Summary

i) The Commission and its consultants have, within an extremely short timeframe, prepared Draft Determinations of the FPP prices for UCLL and UBA services (together **the Draft Determinations**) and supporting cost models (together **the TERA model**). The purpose of this exercise is, as prescribed by the Telecommunications Act 2001 (**the Act**), to determine the forward-looking cost-based TSLRIC price for the UCLL and UBA services. These are essential inputs to the delivery of affordable and competitive fixed broadband and voice services across New Zealand, services upon which a substantial volume of end users of telecommunications services rely and will continue to rely for some time.

ii) There is general agreement that TSLRICs must reflect the price of a hypothetically efficient operator (**HEO**) deploying a network using modern equivalent assets (**MEA**). However, we have identified a large number of material departures from this principle in the Draft Determinations and the TERA model.

iii) The models and determinations reflect a series of decisions and assumptions that each independently tilt the Commission's calculations of UCLL and UBA upwards. The cumulative effect of these individual upward tilts is further amplified when considered collectively. As a result, the Commission has produced UCLL and UBA prices that are at odds with the Act and, as a result, do not reflect a central estimate of the true TSLRIC cost.

iv) The speed at which the TERA model has been created has inevitably involved compromises being made in terms of the analysis undertaken, assumptions made and accuracy of cost inputs. Unfortunately these compromises will, if unchanged, result in an outcome with substantial and enduring negative effects on retailers and end users of telecommunications services. All windfall gains accruing to Chorus from prices set above TSLRIC will have a direct impact on New Zealand consumers.

v) Throughout the debate on copper pricing, Chorus has continually expressed a view that New Zealand's unique characteristics must result in significantly higher TSLRIC prices than overseas, and that the careful international forward-looking cost-based benchmarking does not reflect the costs an HEO would face in New Zealand.

vi) The TERA model and resulting price, in its current form, may at first glance appear to support that proposition. However, on closer inspection by our consultants, WIK-Consult (**WIK**) and Network Strategies (**NWS**), the TERA model is revealed as characterised by significant inaccuracies, incorrect assumptions, simplistic assumptions and documentation and other errors. Together, these result in a material overstatement of the TSLRIC of delivering UCLL and UBA services in New Zealand. This must be corrected if the Commission is to properly implement the framework for TSLRIC pricing set out in the Act.

vii) WIK conclude that making adjustments to address these defects would result in a UCLL TSLRIC cost in the range of $14-16 and a UBA TSLRIC uplift cost in the range of $7 - $8. These figures raise serious questions about the contention that New Zealand TSLRIC prices for UCLL and UBA services materially differ from the benchmarked comparable jurisdictions utilised in the IPP determinations of UCLL and UBA prices. What is also clear from the analysis undertaken by our consultants is that is the sensitivity of small but important corrections and refinements of

assumptions and input parameters leads to significant changes in the model's TSLRIC calculation.[1]

viii) This submission, together with supporting analysis from WIK and NWS recommends that the following adjustments should be made to the Commission's approach:

Analytical step	*Problems*	*Recommendations*
s 18	Predictability as a stated objective, with the Commission believing that its TSLRIC is orthodox and that a s18 uplift may be applied. The Commission's positive externalities assessment is deficient.	Predictability externalities should not be relied on by the Commission to support a s 18 uplift. The Commission should also confirm its position that no s 18 uplift will be made based on its inadequate assessment of positive externalities.
MEA	Models use different MEAs for UCLL and UBA, despite the Commission being bound as a matter of law to adopt this same MEA for both UCLL and UBA.	Issue a revised Draft UBA Determination that adopts the same MEA used in the Draft UCLL Determination.
MEA network design	Inefficient network optimisation, technology choices are not MEA and component costs not efficiently priced.	Efficient network deployment is required by the MEA technologies with competitive asset prices. The Commission should adopt NWS's estimates for use in conjunction with its own model.
Re-use of Assets	No asset re-use allowed, contrary to how an HEO would deploy network, Chorus' actual deployment, and regulatory best practice elsewhere.	Ensure the HEO exploits all opportunities to share infrastructure within its own network, with other telecommunications providers and with other utilities.
FWA	Current FWA networks are built according to Government coverage objectives rather than a rational network optimisation, and so not reflective of an HEO. NWS estimate this creates a 37% over-estimate in non-urban cost per customer.	Design a FWA component consistent with a HEO MEA optimising coverage to all viable consumers. While we recommend a first principles optimisation we have requested NWS create a FWA cost modelling approach that will fit with TERA's current model, and this is provided as an input to the Commission's process.
Demand	Based on within-TSO footprint rather than profitable customers, and ignores population growth.	Use current information and include viable customers and population growth in demand.
Price trends	Outdated data is used, relevant price forecasts are ignored, earthquake related inflation is erroneously included and calculations contain errors.	Ensure current price information is used, calculation errors are corrected and reliable independent forecasts are more extensively used.
Trenching costs	Urban trenching costs assumed. Assumptions are simplistic, contract cost information is limited.	Undertake an extended analysis of trenching costs and have regard to the HEO's scale.
Subsidies	Ignoring government subsidies and customer contributions leads to double counting.	Either abstract from any subsidies in defining network coverage, or assume current coverage requirements and include related subsidies. Recognise customer lead-in contributions.
WACC, Tax and Risk	Windfall gains are being created, inappropriate inclusions bias the calculations upwards and asset betas are overestimated.	Apply the regulatory term to the debt premium's calculation, update the debt survey, employ a median average and remove Deutsche Telekom from the cost of equity sample and remove the certain years from the asset beta calculation.

[1] See sensitivity analyses undertaken by WIK and NWS.

		Tax-adjustments must be transparent and asymmetric risk should be recalculated.
Cost allocation methodology	Cost allocation is inconsistent. Inaccurate allocations result in cross subsidies and skewed deployment (or maintenance) incentives for Chorus.	Adopt more realistic cost allocations based on actual resource use.
TERA's modelling	Model does not wholly reflect decisions within the Draft Determination, and contains errors, inconsistencies and limitations.	The TERA model can and must be improved. Discrepancies between model documentation and the model must be corrected. Identified 'break points' must be 'mended', manual processes should be automated, and computational capacity limitations resolved.

ix) These recommendations are evidence-based, will bring the Commission's calculation closer to the TSRIC for an HEO deploying MEA and, critically, are feasible for TERA to implement within or alongside the existing model. We understand the challenges the Commission faces in carrying out a TSLRIC exercise, and look forward to continuing engagement as this process continues.

x) The **Chorus network cost models** developed by Analysis Mason do not represent an HEO deploying a MEA network, are fundamentally inconsistent with the Commission's criteria and principles for a TSLRIC calculation, and are wholly unsuitable to inform the TSLRIC modelling that the Commission is required to perform.

xi) We do not agree with the Commission's stated preliminary view that backdating prices is appropriate. We will submit more fully on this point once the Commission has published draft reasons regarding backdating in its further Draft Determination. However, backdating is not the appropriate course in this instance – not least because it will result in a pure wealth transfer and material detrimental effects for both access seekers and consumers. If the Commission were to retain its current view on backdating, any backdated cost to access seekers must be included in the FPP monthly charge and so the total backdated sum be recovered incrementally on a forward looking basis.

A Introduction

A1.1 Vodafone welcomes the opportunity to comment on the Commission's draft UBA and UCLL price determinations and accompanying reports released on 2 December 2014. Specifically, we review and provide recommendations in respect of the

(a) The Commission's Draft pricing review determination for Chorus' unbundled copper local loop service (**Draft UCLL Determination**);

(b) The Commission's Draft pricing review determination for Chorus' unbundled bitstream access service (**Draft UBA Determination**);

(c) **TERA's Model Reference Paper**, **Model Specification** and **Model Documentation;**[2]

(d) Beca's FPP Corridor Cost Analysis (**Beca Report**);[3]

(e) Ingo Vogelsang's TSLRIC implementation report (**Vogelsang Report**);[4] and

(f) Analysys Mason's models commissioned by Chorus and the **Chorus UCLL TSLRIC user guide** and **Chorus UBA TSLRIC user guide**.

A2 Independent expert reports

A2.1 This submission should be read along with the expert reports prepared by WIK (**WIK Report**)[5] and NWS submission on the draft determinations (**NWS Report**)[6] and on modelling fixed wireless access (**NWS FWA Report**).[7]

A3 Structure of this submission

A3.1 This submission is structured in three parts:

(a) Part 1 – Submission on Commission's draft determinations and supporting documents;

(b) Part 2 – A critique of AM's model; and

(c) Part 3 – Submission on Commission's preliminary view on backdating.

A3.2 This submission contains no confidential information.

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[2] TERA *Model Reference Paper* (public version), November 2014, TERA *Model Specification* (public version), November 2014 and TERA *Model Documentation* (public version), November 2014.

[3] Beca *FPP Corridor Cost Analysis of Trenching and Ducting Rates in NZ*, November 2014.

[4] Ingo Vogelsang, *Current academic thinking about how best to implement TSLRIC n pricing telecommunication network services and the implications for pricing UCL in New Zealand*, 25 November 25 2014.

[5] WIK-Consult, *Submission In response to the Commerce Commission's "Draft pricing review determination for Chorus' unbundled bitstream access service" and "Draft pricing review determination for Chorus' unbundled copper local loop service" including the cost model and its reference documents*. 19 February 2015.

[6] Network Strategies, *Commerce Commission Draft Determination for UCLL and UBA, A review of key issues*, 20 February 2015.

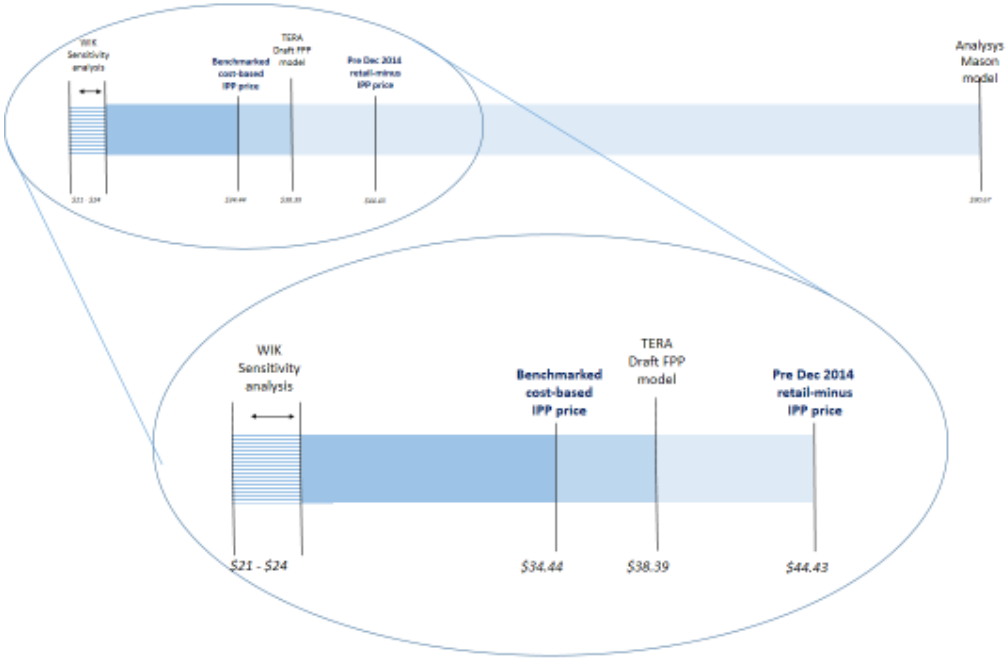
[7] Network Strategies, *Modelling Fixed Wireless Access, UCLL and UBA Final Pricing Principle,* 20 February 2015.

A4 Implications of the Commission's Draft Determination

A4.1 The consequences of setting UCLL and UBA prices above TSLRIC cost are significant and long-lasting. We urge the Commission to carefully consider the recommendations in this submission, and those from WIK and NWS.

A4.2 As it stands, the choices that the Commission has made as reflected in the Draft Determination materially overstate the TSLRICs of delivering UCLL and UBA services in New Zealand. Figure 1 below, derived from analysis by WIK, clearly shows that FPP prices below the level suggested by benchmarks used in the IPP process is appropriate. Certainly, there is no credible basis for setting FPP prices anywhere near the upper bound suggested by Analysys Mason.

Figure 1: Comparison of IPP, Draft Determination (TERA's modelling), WIK's sensitivity analysis of TERA's approach and Chorus' outlier.



A4.3 An outcome that results in overstatement of TSLRIC costs does not properly implement the framework and objectives set out in the Act. We have made a number of recommendations that address the defects in the Commission's current approach that will, if unchanged, lead to this result.

A4.4 These recommendations have been carefully drafted so as to be feasible to implement. Some recommendations, such as inclusion of population growth projections, will require TERA to amend their approach in the geospatial step that occurs prior to cost modelling. However, most other recommendations can be achieved through amendments in TERA's cost model's assumptions, architecture, level of granularity and inputs. These recommendations must be implemented for the Commission to be satisfied it has arrived at a determination of wholesale prices reflecting its stated intention of modelling an HEO deploying a MEA network, and has thus achieved a central estimate of TSLRIC pricing.

Part 1: Commission's Draft Pricing Review Determination for Chorus' UCLL and UBA Service

B Section 18

B1 Required approach

B1.1 The framework for determining FPP prices for UCLL and UBA services gives the Commission broad discretion in terms of the choices it makes. The statutory definition of TSLRIC provides limited practical guidance on choices that must be made when determining FPP prices for the UCLL and UBA services.[8] Without a detailed formula in the Act prescribing exactly how FPP prices for UCLL and UBA services are to be set, the Commission necessarily has an area of judgement.[9]

B1.2 Section 18 is a mandatory relevant consideration that the Commission must address when making a determination under the Act. This has been well traversed by parties in earlier phases of these proceedings, and in prior regulatory decisions taken by the Commission under the Act. In this case, the Commission is plainly required to make determinations in respect of both UCLL and UBA prices that it considers best gives, or is likely to give, effect to the purpose in s 18.[10] This is an evaluative exercise and the Commission may prioritise current or future effects when assessing how best to promote the purpose in s 18.[11]

B1.3 While the Commission is also required to consider additional factors, including those specified in s 18(2) and (2A), these additional considerations are specified in the Act simply "*...for the purpose of assisting analysis under s 18(1)*" (emphasis added).[12] They do not displace or amend the Commission's primary duty. Throughout this exercise the Commission's primary duty in s 18(1) remains the promotion of competition for the long-term benefit of end-users.[13]

B1.4 Two significant features of the Commission's application of s 18 in the Draft Determination are:

(a) its adoption of 'predictability' as an objective; and

(b) its reliance on advice regarding positive externalities prepared by Professor Vogelsang.

B1.5 The Commission's approach is for each of these is described below, in turn.

B2 Predictability

The Commission's approach to predictability

B2.1 The Commission states that the application of TSLRIC methodology is designed to implement the s 18 purpose statement (i.e., that setting a price based on forward looking efficient costs will

[8] Draft UCLL Determination at [123]; Draft UBA Determination at [70].

[9] *Chorus v. Commerce Commission and others* [2014] NZHC 690 (the 'High Court judgment') at [15] and [139] *Chorus v. Commerce Commission and others* [2014] NZCA 440 (the 'Court of Appeal judgment') at [49]; [152] and [159]

[10] s 19(c) of the Act.

[11] Court of Appeal judgment at [152].

[12] High Court judgment at [34].

[13] High Court judgment at [34] cites s 18(1) as the "*dominant provision*" s 18. The Court of Appeal judgment at [41] notes that reference in s 18(1) to "*the long-term benefit of end-users of telecommunications services*" relates to consumers.

generally promote competition).[14] Vodafone agrees with this general proposition – and with the Commission's consequential view that s 18 cannot override the requirements and constraints of a TSLRIC exercise.[15] Approaches prescribed in the Act can't be overridden by s 18.

B2.2 The Commission considers that the 'predictability' of its FPP determinations will affect competition (for the long term benefit of end users).[16] Accordingly, it has decided that when determining FPP prices for UCLL and UBA services "*...we should give weight to choices that provide greater regulatory predictability by generally adopting an approach that is considered to be an orthodox TSLRIC approach internationally*".[17] But the Commission goes further than this. Predictability is adopted as an objective with the Commission reasoning that:[18]

> *...[p]redictability supports investment incentives (as explained above), which in turn supports competition for the long-term benefit of end-users. When businesses invest in their products and processes, consumers can benefit from, for example, the introduction of new and innovative products and services, improvements in the quality of existing products and services, and through lower cost ways of producing existing products. Ensuring that businesses have incentives to invest is therefore important for the promotion of competition for the long-term benefit of end-users. It follows that giving effect to regulatory predictability is likely to give effect to the section 18 purpose statement"* (emphasis added).

B2.3 This approach relies on three propositions being accepted:

(a) adopting 'predictability' as an objective when determining FPP prices for UCLL and UBA prices is appropriate;

(b) if it is an appropriate objective, predictability is delivered by adopting an orthodox TSLRIC approach; and

(c) the TSLRIC approach that the Commission has adopted is in fact orthodox.

B2.4 The Commission notes that factors other than predictability, including efficiencies, incentives to invest and relativity also affect competition (for the long term benefit of end users).[19] Of these, it considers that incentives to invest are specifically affected by the predictability of its determinations.

Use of the 'predictability' concept

B2.5 Vodafone agrees that a decision which undermines incentives to invest may undermine competition over the long run and consequently may not be in the long-term benefit of end-users.[20]

[14] Draft UCLL Determination at [197]-[198]; Draft UBA Determination at [167-168].

[15] Draft UCLL Determination at [198]; Draft UBA Determination at [168].

[16] Draft UCLL Determination [190]; Draft UBA Determination at [268.1].

[17] Draft UCLL dete Determination rmination at [126]; Draft UBA Determination at [212]. The Commission notes that "*...a more predictable approach would generally be an approach that is considered to be an orthodox TSLRIC approach internationally*" (Draft UCLL Determination at [241]).

[18] Draft UCLL Determination at [131]; Draft UBA Determination at [101].

[19] Draft UCLL Determination at [190]; Draft UBA Determination at [160].

[20] See Vodafone submission (20 August 2014), B1.4.

B2.6 However, this does not justify the Commission prioritising consideration of predictability, efficiencies, investor expectations or incentives to innovate - or any other individual factor - such that it alone effectively decides whether a determination is consistent with the primary duty in s 18(1).[21] An individual factor cannot become a goal or objective of itself. It only has relevance in terms of its connection with s 18(1). We have previously put this point as follows: innovation and investment incentives cannot be treated as 'trump' factors, or analysed without reference back to the overriding purpose of promoting competition in telecommunications markets for the long-term benefit of end-users.[22]

B2.7 It is apparent from the Draft Determinations that the Commission is placing substantial weight on the concept of predictability to do exactly this ,i.e. to identify the outcome that best promotes competition for the long term benefit of end users. The Commission considers that giving effect to predictability is likely to give effect to s 18 and accordingly refers to predictability as its objective. Vodafone submits that this approach is not correct.

B2.8 The Commission explains its preliminary decision to account for predictability in the Draft Determinations, while accepting that there is no valid basis upon which it could account for reasonable investor expectations, as follows:[23]

> *In terms of the distinction between predictability and investor expectations, part of our approach to the application of TSLRIC is to give weight to greater predictability of approach by generally adopting an orthodox TSLRIC approach. We note that this promotes predictability without attempting to identify and give weight to reasonable investor expectations as a separate exercise.*

B2.9 In effect, the Commission has simply substituted 'predictability' for the previously employed 'reasonable investor expectations' concept.[24] The mischief is the same in either case - a single extraneous value is imported and prioritised as a decision making objective that is assumed will give effect to the Commission's primary duty under s 18(1). Insufficient reasoning is provided, nor can it be, as to:

(a) why this value should be prioritised; and

(b) how, in fact, it gives effect to the Commission's primary duty.

B2.10 A key reason for the Commission prioritising predictability as an objective is its view that frequent changes to regulatory approach can lead to a lack of regulatory predictability which in turn can harm investment incentives.[25]

B2.11 Vodafone submits that it is not the Commission's role when determining FPP prices for UCLL and UBA services to make decisions in a manner that ameliorates any uncertainties that may arise from the regulatory approach or framework embodied in the Act. There are three reasons for this:

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[21] See Vodafone submission (20 August 2014), A3, A4 and B1.5. As the Court of Appeal judgment made clear at [42], "*...s 18(2A) is a subset of s 18(1).*"

[22] See Vodafone submission (20 August 2014), D1.14,

[23] Draft UCLL Determination at [186].

[24] Indeed, language used in the Draft UCLL Determination at [131] in respect of predictability mirrors language used earlier in the Commissions in the Proposed Views Paper (9 July 2014) at [80].

[25] Draft UCLL Determination at [130]; Draft UBA Determination at [100]. The Commission also refers to unpredictable changes in regulatory environment having this effect.

(a) it is not clear that predictability even arises as an issue in this case;

(b) even if uncertainty does arise through the proper application of the Act (i.e., the application of TSLRIC), there is no provision in the statute to remove this through the overlay of a 'predictability test'; and

(c) the academic literature cited by the Commission does not support the proposition that individual decisions (made within a static regulatory framework as set out in legislation) should be adjusted to account for their effects on investment incentives (or to promote a 'predictability test').

Predictability issues do not arise in this case

B2.12 It is not clear whether what the Commission refers to as uncertainties arising from "frequent changes to the regulatory approach" or "unpredictable changes in the regulatory environment" even arise as relevant issues. As the High Court judgement noted at [167] "*...the new statutory regime was always going to drive a pricing sea-change*". This is particularly true for this first instance determination of FPP prices for UCLL and UBA services. Unpredictability is inherent in this process because: (i) it has not been done before; and (ii) statute provides no detailed formula as to how it must be done. The outcome of the TSLRIC methodology in this instance is a function of modelling choices, such that no party can have any 'predicted' expectation of its outcome.

B2.13 As WIK notes in this respect:[26]

> *... the outcome of the modelling cannot be predicted in detail and the potential spread of the modelling outcome can be large. The Commission has made clear throughout the modelling process that it has a variety of options in its modelling approach and is not constrained by the Act in its choice. Furthermore, the choice of input parameters has a significant impact on the modelling outcomes. If a modelling exercise is conducted for the first time the criterion of "regulatory predictability" is relatively meaningless with regard to the outcomes of the model."*

There is no provision in the Act for a 'predictability test' in any case

B2.14 Even if applying TSLRIC methodology within the framework of the Act did create uncertainties, there is no provision in that statute for the Commission to remove these by overlaying a 'predictability' test to its decisions. The requirement in s 18(2A) is for the Commission to consider impacts arising directly from its decisions – not from the specified regulatory approach or environment within which these decisions must be made.

B2.15 However, the Commission's reasoning that predictability should be given greater weight relies substantially on a view that this is necessary to avoid uncertainty arising from changes to 'frequent changes to the regulatory approach' or 'unpredictable changes in the regulatory environment'.[27] These considerations are entirely irrelevant in the context of determinations regarding FPP prices. No change to regulatory approach or environment is involved in this exercise. The approach and environment in which these determinations is being made has been indisputably clear since 2011 amendments to the Act were made. To the extent that the outcome of this approach and environment can't be predicted, this is an implicit function of TSLRIC methodology – to repeat the point made by WIK: predictability is meaningless with regard

[26] WIK Report at s 1.1.2.1.

[27] Draft UCLL Determination at [130]; Draft UBA determination at [100].

to the outcomes of TSLRC modelling exercise. It follows that there is no justification for the Commission applying an extraneous predictability concept to alter the outcome of a TSLRIC process, not least because this is contrary to the principle, which the Commission accepts, that application of TSLRIC methodology by its nature implements the s 18 purpose statement.

The Commission's approach is not supported in the literature on which the Commission relies

B2.16 The academic literature cited by the Commission does not apparently support for the proposition that individual decisions – made within a static regulatory framework set out in the Act – should be adjusted to account for their effect on investment incentives (or to favour an extraneous 'predictability' concept). For example, Guthrie (2006)[28] examines the relationship between the nature of a regulatory regime and the investment behaviour of the firms subject to that regime. It examines "*...the different ways in which the regulation of infrastructure industries impacts on the investment behaviour of firms operating in those industries*" [at page 6]. Laffont and Tirole (2003)[29] examine the under-investment effect that may arise from the absence of a long-term commitment between the regulator and regulated firms, and in particular the proposition that: "*[b]y promising more ex post incentives...the regulator can induce more investment by the firm*" [at page 102].

B2.17 It is unclear how this consideration is relevant in the context of this first instance determination of FPP prices for UCLL and UBA services, not least because:

(a) There is no prior commitment by the Commission regarding FPP prices for UCLL and UBA services. Indeed, any such prior commitment would be antithetical to a price discovery exercise contemplated by the TSLRIC methodology. Again, no party could have any reasonable expectation that an initial determination of FPP prices for UCLL and UBA services would deliver on a prior regulatory commitment (and we are not aware of any such commitment).

(b) Any consideration of 'regulatory promise' would arise only where subsequent determination of FPP prices for UCLL and UBA service, i.e. in the context of what Laffont and Tirole refer to "*...repetition of the relationship between the regulator and the firm*" [at page 102]. By definition, this first instance determination of FPP prices involves no such repetition.

Is Commission's TSLRIC approach orthodox?

B2.18 The Commission considers that it promotes predictability by adopting a stable, well-established and internationally orthodox approach when applying TSLRIC.[30] An orthodox application of TSLRIC is fundamental to its "construct of predictability".[31]

B2.19 Vodafone submits that in fact the approach taken by the Commission when applying TSLRIC is not orthodox. At each point where application of the TSLRIC methodology has required the Commission to make a modelling choice, it has made a selection that operates in favour of the access provider. These decisions result in a plainly unorthodox cost model. As just one example, in using the RBI footprint as the boundary for the FWA footprint, the Commission it has in its own

[28] Graeme Guthrie *Regulating Infrastructure: The Impact on Risk and Investment* (2005).

[29] Jean-Jacques Laffont and Jean Tirole *A Theory of Incentives in Procurement and Regulation* (1993).

[30] Draft UCLL Determination at [126.1]; Draft UBA Determination at [96.1].

[31] Draft UCLL Determination at [137]; Draft UBA Determination at [107].

words taken "*a conservative approach to the extent of FWA in the modelled network.*"[32] Additional instances in which the Commission has made choices that favour the access seeker are identified by NWS at section 10.1 of the NWS Report.

B2.20 Cumulatively, these choices do not yield an approach that can be considered orthodox in any real sense. The Commission's use of skewed assumptions in its modelling exercise means that it has not achieved its stated aim of developing a central estimate of the true TSLRIC cost. Rather, the combined effect of these assumptions is a price calculation that in fact approaches an upper bound.

B2.21 Adopting a balanced approach that better reflects an orthodox application of TSLRIC requires the Commission to make the adjustments suggested by NWS at section 10.1 of the NWS Report.

B2.22 As it stands, the Commission has also made modelling assumptions that do not accord with international practice. WIK notes generally that many input parameters used by the Commission (such as equipment prices and also other cost parameters) are inflated compared to a relevant international best practice benchmark. Similarly, the Commission's treatment of reuse of civil engineering assets is at odd with leading regulatory approaches.[33] The tendency for the Commission's assumptions to deviate from international best practice also undermines its contention that its approach to TSLRIC modelling is orthodox.

Macro-economic considerations are irrelevant

B2.23 Finally, the Commission considers that a lack of predictability can affect confidence and investment incentives more broadly. It is unclear how this factor is relevant to FPP pricing decisions, given the primary purpose in s 18(1). Even if the Commission's view is correct, this sort of macro-economic policy consideration is irrelevant to the application of the TSLRIC methodology or to promoting competition for the long term benefit of end users of telecommunications services. This is the case unless the Commission can demonstrate how these broader effects actually impact on these end users. There is nothing in the Draft Determinations that makes this link.

B2.24 As we have argued before,[34] it is not sufficient for the Commission to simply assume that the very material direct effects on consumers that arise from the position set out in its Draft Determinations, i.e. overestimate of the TSLRICs for UCLL and UBA services with consequential effects on retail prices, will as a matter of course be offset by dynamic efficiency benefits. We understand the Commission's preference for prioritising dynamic efficiency benefits, but whether it is appropriate to prioritise dynamic efficiency depends on the facts of each case, the nature of the decision being made and the full range of its effects. The Commission must assess the likelihood and magnitude of each type of efficient gains before deciding how that should be prioritised. It cannot be the case that dynamic efficiency benefits, which are not clearly identified and which are not accompanied by any clear explanation as to how they accrue to end users, should be ranked above certain and substantial effects in the form of higher than appropriate prices for end users.

[32] Draft UCLL Determination at [285].

[33] See paragraph F1.2(d) below.

[34] Vodafone submission on UBA service price review update paper (3 September 2013).

B3 Positive externalities

The Commission's approach to positive externalities

B3.1 In respect of the UCLL price, the Commission considers that to best give effect to the s 18 purpose statement it must also account for 'asymmetric costs': the asymmetry of impact arising from the costs incurred when over-estimating versus underestimating the regulated price.[35] It explains that:[36]

> *…in considering the section 18 purpose statement, we are considering whether an adjustment to our central TSLRIC estimate is required to promote competition for the long-term benefit of end-users. Therefore we must consider not only whether a section 18 adjustment promotes competition, but also whether it does so for the long-term benefit of end-users. Accordingly, the long-term impacts on end-users' welfare are relevant to this analysis.*

B3.2 In this respect, the Commission is concerned that a price that is too low "*…could slow migration to fibre-based services, with consequential impacts on the welfare benefits arising from migration to fibre networks.*"[37] This view seems to be based exclusively on Professor Vogelsang's assessment that there may be positive externality effects from higher UCLL (and therefore total UCLL plus UBA prices).[38]

B3.3 The Commission's view, based on this theory, is that it should err on the high side to avoid the consequences of setting too low a price. However, its preliminary conclusion is that a 's18 uplift' is unnecessary because the TSLRIC modelling choices it has made "naturally mitigate" asymmetric cost concerns. It nevertheless considers that it retains the ability to make an uplift with reference to positive externalities and sets out in detail the basis upon which it might do so.

Reliance on positive externalities

B3.4 The Commission's assessment of the nature and likelihood of positive externalities resulting from higher total price relies exclusively on advice prepared by Professor Vogelsang. The manner in which the Commission has relied on this advice is defective.

B3.5 This flawed approach remains relevant because, although the Commission has not made a 's 18 uplift' to the UCLL price in its UCLL Draft Determination, it considers that this option is open to it noting that:[39]

> *[w]e continue to hold the view …that there is an asymmetric cost issue, which would give weight to erring on the high side to avoid negative consequences on the long term benefits of end users of setting a price that is too low.*

B3.6 We disagree: there is no valid basis for uplift on these terms.

[35] Draft UCLL Determination at [416]; Draft UBA Determination at [378].

[36] Draft UCLL Determination at [418].

[37] Draft UCLL Determination at [419].

[38] Professor Ingo Vogelsang *The effects of the UCLL contribution to the UBA aggregate on competition for the long-term benefit of end-users in New Zealand telecommunications markets* (2 July 2014) ('the Vogelsang Report') at [29].

[39] Draft UCLL Determination at [451].

Professor Vogelsang's advice on positive externalities is tentative

B3.7 We continue to find the Commission's reliance on Professor Vogelsang's advice regarding positive externalities extremely troubling where, as advice makes clear, these effects are (at best) likely to occur and also likely to be small.[40]

B3.8 Professor Vogelsang notes that an increase in the UCLL service price increase could result in positive welfare effects including "*…innovation effects on UFB and potential spillovers on other markets and the whole economy and conventional network externalities from migration to new services*."[41] He does not assert that positive externalities will, as a matter of fact, result from an increased UCLL service price. Equally, his advice does not speculate as to the economic value of positive externalities that might result from a higher total price.

B3.9 The Commission relies on a selective reading of Professor Vogelsang's advice, which in isolation appears more certain as to the likelihood of positive externalities resulting:[42]

> *Innovation benefits will come from the financial benefits for other networks and for content providers serving these networks. Additional externalities will accrue to the pre-existing subscribers of these services, who benefit from the additional or cheaper content made available to them.*

B3.10 This apparent certainty of this paragraph is not reflected in Professor Vogelsang's advice when read as a whole. Vodafone submits that the Commission could not apply a s18 uplift based on such equivocal evidence.

Professor Vogelsang's advice does not identify which positive externalities would accrue to end users of telecommunications services, or how this would happen

B3.11 The Commission notes that when considering the s 18 purpose statement in the context of an uplift to the UCLL price"*…we are considering whether an adjustment to our central TSLRIC is required to promote competition for the long-term benefit of end users of telecommunications services*".[43]

B3.12 Professor Vogelsang's assessment refers at high level to a range of positive externalities. Financial benefits for other networks and for content providers serving these networks, assuming they did occur and were not *de minimis* (which they may be), would be positive externalities. However, it is not clear whether or how these benefits would accrue to end users of telecommunications services.

B3.13 Indeed, as a matter of statutory interpretation (tracking through the definitions in s 5 of the Act) innovation benefits for content providers serving networks may be incapable of being counted as benefits to end users of telecommunications services. To the extent that these benefits arise in respect of broadcasting activities of content providers, they can't be counted as benefits to end users of telecommunications services. It may be that Professor Vogelsang has in mind other positive externalities – but the point is he does not distinguish between effects that may accrue to end users from those that must be discounted as end user benefits.

[40] Vogelsang Report at [44].

[41] Vogelsang Report at [5].

[42] Vogelsang Report at [29]. This passage is cited by the Commission in the Draft UCLL determination at [417] and [430.2].

[43] Draft UCLL Determination at [418].

B3.14 This encapsulates Vodafone's overall criticism of the Commission's reliance on Professor Vogelsang's advice regarding positive externalities. He identifies some examples of positive externalities that in no way purports to be exhaustive. Those examples cited by the Commission in support of a potential s 18 uplift are at best they are externalities with wider effects favouring a broader group than end users. At worst they are incapable of be attributed as benefits to end users (there is certainly no explanation as to how they accrue to this group). In all instances, Professor Vogelsang does not explain with any precision how these externalities will promote competition for the long term benefit of end users.

B3.15 Vodafone submits that it is not enough for the Commission simply to adopt all positive externalities identified by Professor Vogelsang uncritically and substantial additional analysis to show how positive externalities that are relied on as justification for a s 18 uplift actually deliver end user benefits.

B3.16 This example illustrates a more general pattern in the Commission's approach in parts of the Draft Determinations: in places it is extremely difficult to understand the Commission's operative reasoning – *how* it has derived a preliminary view from the evidence and argument before it. It is not acceptable for the Commission to simply summarise evidence before it and arrive at a view on which evidence is to be preferred, it must explain the basis for its decision.[44] In other places, the Commission has simply not made transparent the modelling analysis that it relies on.[45] In either instance, Vodafone simply cannot comment meaningfully on the Commission's preliminary views whether its reasoning and underlying evidence relied on is not disclosed.

Recommendation 1	Predictability should not be an objective of the Commission's decision making process. There is no case for including predictability as a standalone consideration when making first instance determinations of prices for UCLL and UBA services.
Recommendation 2	The Commission should make no s18 uplift to account for predictability as a standalone objective.
Recommendation 3	The Commission should confirm its preliminary conclusion that no s 18 uplift should be made to the UCLL price in reliance of positive externality effects

C Modern Equivalent Asset

C1 As the Commission notes, an MEA is a modern equivalent asset that an efficient operator would build today to provide the service in question.[46] Use of an MEA meets the requirement to determine forward-looking costs over the long run, and the TSLRIC objective of promoting efficient investment.[47]

[44] The position is more acute in respect of Professor Vogelsang's assessment of positive externalities – in the sense that countervailing consideration of the absence of any compelling evidence of such externalities does not appear to be weighed at all.

[45] See paragraph M1.11 below.

[46] Draft UCLL Determination at [147]; Draft UBA Determination at [117].

[47] Draft UCLL Determination at [148]; Draft UBA Determination at [118].

C2 In respect of UCLL, the Commission considers that a HEO would deploy the network technology that is most efficient in terms of cost, lifetime and technological performance.[48] The hypothetical network is a replacement for Chorus' existing network.[49]

(b) The Commission is not required to select an MEA that enables Chorus to continue delivering the full functionality of UCLL service.[50] In this sense, the Commission has discretion as to MEA that it selects. However, the key constraint on MEA selection is, as Vodafone has argued throughout this process, that the Commission's TSLRIC modelling should adopt a single MEA, i.e. the same MEA must be used to determine FPP prices for both UCLL and UBA services.[51]

(c) FWA must be part of the single MEA used by the Commission as it is a common feature in orthodox LRIC modelling.[52] This reflect the principle that the MEA selected should be oriented at what a HEO would deploy today if building a new network from the scratch. Fibre has significantly superior transmission characteristics with regard to bandwidth and transmission quality.[53] The practice of other regulatory authorities and our own experience also suggests that a FTTH and FWA hybrid network is the most likely MEA deployment scenario.

(d) The Commission has selected a FTTH and FWA hybrid network as the MEA it will use when determining the FPP price for the UCLL service. Our view remains that the most appropriate MEA for the UBA service in New Zealand should be FTTH and FWA, in particular when that is also the relevant MEA for providing UCLL. This would be the most efficient approach for an operator which provides both the UBA and the UCLL (and other access) services to take.[54]

C1 But the Commission doesn't adopt this approach. Instead it says "*we must presuppose that the MEA of those additional components [i.e. the "additional costs" component of providing the UBA service] would exist on Chorus' copper access network*."[55]

C2 However, the only reference to copper in the UBA FPP is to the Unbundled Copper Local Loop price, network doesn't come into it.

C3 More fundamentally, having selected a FTTH and FWA hybrid network as the MEA in respect of the UCLL service, the Commission is bound as a matter of law to adopt this same MEA in respect of the UBA service. A single MEA must be used for determining UCLL and UBA prices

C4 Our reasons for this view are set out in detail in an opinion prepared for Vodafone by Paul Radich QC and Matthew Smith (**the MEA Opinion**), provided with this submission, which says in summary that:

[48] Draft UCLL Determination at [152]; Draft UBA Determination at [122].

[49] Draft UCLL Determination at [159]; Draft UBA Determination at [129].

[50] Vodafone submission (20 August 2014) at [D2.16].

[51] Vodafone submission (20 August 2014) at [A8(a)] and [C3.5]; Vodafone submission (14 February 2014) at [D1.2].

[52] Vodafone submission (20 August 2014) at [D2.19].

[53] WIK Report at s 2.2.

[54] *ibid*.

[55] Draft UBA Determination at [227].

(a) It is not tenable for the Commission to use different MEAs is respect of UCLL and UBA services – the same MEA must be used when determining the FPP prices of both services.

(b) The UBA FPP price is composed of two components: (i) the UCLL price; and (ii) the UBA uplift. The Act requires that the applicable UCLL price is used as the first of the two components which together make up the UBA FPP price.

(c) It is contrary to the Act, and an error of law, for the Commission to determine the UBA FPP price by using as the first component for the UBA FPP price a different price/model derived from Chorus' existing unbundled copper local loop network, which is what the Commission proposes doing in the UBA FPP draft determination.

(d) This is not a case in which different interpretations of the Act are open to the Commission. Rather, it is a case in which there is only one right answer. The Commission has no discretion to choose between a range of available interpretations.

C5 The only proper approach open to the Commission is to use the same single MEA when determining FPP prices for both the UCLL and UBA services.

C6 The fact that the Commission has undertaken work to determine the FPP price for the UBA service, and issued a Draft Determination based on an incorrect interpretation of the Act does not justify the Commission maintaining its current approach for pragmatic reasons.

Recommendation 4	The Commission must issue a new Draft UBA FPP Determination. This Draft Determination must adopt the same MEA that is used in the Draft Determination for the FPP price for the UCLL service.

D MEA Network design

D1 Introduction

D1.1 Vodafone supports the Commission's adoption of FTTH and FWA as the MEA for UCLL.[56] We also endorse the decision to also model a copper-based network, to enable a downward adjustment in price if the copper-based modelling proves a lower cost solution (reflecting the enhanced capability of an FTTH and FWA network over a copper-based network).[57]

D1.2 In order for a TSLRIC cost model to appropriately reflect the expected investment choice of an HEO, it needs to produce accurate results about the expected costs and enable a true "apples with apples" comparison across MEA choices.[58] The draft model does not yet permit this. This section provides an overview of the key changes to MEA network design required for the

[56] UCLL Draft Determination at [286]. As discussed above, we support the adoption of a single FTTH + FWA MEA for both UCLL and UBA.

[57] UCLL Draft Determination at [286].

[58] We note also that WIK observe that "lowest cost" selection of copper over FTTH + FWA does not appear to be based on the annual value of the networks, but instead on an equation deducing SLU backhaul costs from the fibre access costs: WIK at [4.3].

Commission to accurately determine the appropriate MEA and the ultimate TSLRIC cost for the regulated services.

D1.3 Specifically, this section addresses:

(a) Degree of scorching and network optimisation required;

(b) Accurately modelling the copper and fibre access networks

(c) Accurately modelling the core network;

(d) Required efficiency gains missing from the model

(e) Expected trench cost minimisation from an HEO; and

(f) Inaccuracies in the input parameters for network modelling.

D1.4 A more detailed analysis of FWA, re-use of assets and trenching costs are included in section I below.

D1.5 Finally, we refer the Commission to NWS' observation that, for the FTTH component of the MEA, a GPON network is likely to be lower cost and remain capable of unbundling.[59]

D2 Degree of scorching and network optimisation required

D2.1 The Commission's approach to network optimisation is inconsistent with two core principles that the modelling process requires:[60]

(a) it does not adequately reflect the behaviour expected of an HEO (which is unlikely to strictly follow the network routes that exist in the actual incumbent network), especially when (as is the present case, where asset re-use has not been accounted for) the HEO is unable to "re-use" existing copper assets in the manner that Chorus is currently undertaking in reality in respect of the UFB network;[61] and

(b) it does not adequately reflect the proper application of the MEA principle, because a fibre network inherently enables a more efficient topology than a legacy copper network.

D2.2 Vodafone submits that a proper application of a scorched node (or modified scorched node) approach would permit some optimisation of exchanges. More importantly, it must permit the optimisation of cabinet locations. Put simply, an FTTH + FWA MEA which reflects the topology of an FTTN network is incoherent. Constraining the model to take into account all of the existing nodes (both exchanges and cabinets) is overly conservative and risks over-recovery by Chorus. Fibre technology allows fundamentally different line lengths, and accordingly significantly enhanced efficiencies over the FTTN topology adopted in the Commission's model. We agree with WIK that not optimising exchange areas around existing nodes (to reflect the attributes of the MEA) also generates significant inefficiencies in the network design.[62]

[59] NWS Report at s 9.1.

[60] WIK Report at s 1.1.2.7.

[61] For further discussion see Section F 'Re-use of assets' below.

[62] WIK Report at s 3.3.

D2.3 The problems with the Commission's approach are exaggerated by its adoption of separate (and fundamentally different) MEAs for the UCLL and UBA services. Even if appropriate efficiencies (through, for example, a modified scorched node approach which reflects an efficient FTTH + FWA network topology) are achieved at the UCLL level, these will inevitably be lost in respect of UBA additional costs. That is, the additional costs recovered by Chorus in respect of the UBA additional costs will, under the Commission's proposed approach, permit Chorus to recover on inefficiencies in its existing infrastructure. This is inconsistent with the proper application of TSLRIC.

D3 Modelling the access network

D3.1 The Commission models both a copper-based and fibre-based access network for UCLL. In both cases, WIK have identified serious flaws in the cost models which are prone to over-estimate the predicted cost of an HEO (independently from their concerns in respect of network optimisation, discussed above. In particular:

(a) **The approach to engineering is flawed**. TERA's fibre and copper models do not appear to include optimisation to local exchange areas (and, in the case of copper, the location of cabinets). In addition, street-crossings are not appropriately optimised (a crossing appears to be assumed for each building on the "minor side" of the street, as opposed to a crossing shared by neighbouring properties) and (despite the appropriate assumption of "major" and "minor" street sides), this is not fully taken into account for infrastructure costs on the different street sides.[63]

(b) **Backhaul in the access network is consistently over-dimensioned.** WIK observe that 12-fibre cables are used for connecting FTTN cabinets to local exchanges in the copper-based model (when a single fibre strand would be sufficient) and, in some cases, individual 12-fibre cables are used per DSLAM. None of this reflects modern network deployment practice. In the fibre-based model, FWA base stations are assumed to be connected with a 24-fibre cable (when a single fibre or fibre pair would be sufficient), driving additional, inefficient costs for both cables, ducting and trenching.

(c) **Pole and cable dimensioning.** WIK observe that pole dimensioning should be lower for fibre than copper, because fibre cables are thinner and less heavy. This not only effects overhead costs, but also potentially impacts the appropriate assumptions between overhead and undergrounding network assets.[64] As a more general point, WIK observe that the cable surplus assumed in the modelling is too high, significantly exceeding their experience in other markets.[65]

(d) **Inconsistencies are identified between the model documentation and the model.** For example, WIK identify that the model documentation contemplates 11% spare capacity for copper cables, whereas the relevant model parameter is set at 0%.[66] These differences risk undermining the reliability of the model for supporting any final decision on prices for regulated services.

[63] WIK Report at s 4.2.3 and s 4.2.5.

[64] WIK Report at s 5.4.

[65] WIK Report at s 5.8.5.

[66] WIK Report at s 5.12.4.

D3.2 WIK also identify the following flaws which are specific to the copper cost model:

(a) **FWA is ignored for copper**. The Commission models the copper network as a check against the FTTH + FWA MEA. However, it appears to not include a FWA component in its copper modelling. There is no reasonable justification for excluding FWA as an addition to a copper-based (FTTN) network given it is accepted as a viable component of a fibre-based (FTTP) network. An HEO would make use of FWA in remote areas in either scenario.[67]

(b) **Size of cabinet and DSLAMs are inappropriately dimensioned**. WIK observe that the cabinet and DSLAM size assumptions are, in effect, "gold plated". In 85% of cases, a DSLAM of half the size assumed by the Commission's model would be appropriate, and there is no need for a two subrack cabinet or second backhaul fibre.[68] WIK identify comparable problems in respect of the FDS, including the use of out-of-date technology for FDS switches and a failure to include expected flexibility in switch sizes to better optimise cost.[69]

D3.3 Finally, with respect to the fibre-cost model, WIK observe that the:

(a) **sub-ducting efficiencies available with a fibre-based network are not reflected**.[70] Re-sizing fibre cable diameters and sub-duct size would significantly reduce cost (WIK estimate that the trench costs savings by reducing the number of large ducts required from 2 to 1 are between 30% and 70% and from 4 to 2 between 50% and 80%); and

(b) **use of individual sub-ducts for fibre lead-ins exaggerates costs,** because in many cases (i.e., for MDUs) combined cable access could be utilised by an HEO.

Recommendation 5	The Commission must revise its modelling assumptions to ensure both the copper-based and fibre-based models reflect modern and efficient network deployment as expected from an HEO, and permitted by the MEA technologies.
Recommendation 6	The Commission must ensure that the models are consistent (i.e., both the fibre-based and copper-based models should include an FWA component).

D4 Modelling the core network

D4.1 The FTTH + FWA and copper-based cost models must also model elements of the core network.

D4.2 WIK have identified a number of potential inconsistencies and inefficiencies in this aspect of the cost models, which must be addressed in order for the model to reliable support the finding of a TSLRIC price for the regulated services. Specifically, WIK observes:

(a) that the core network modelling assumptions reflect, on the one hand, assets as they are installed in Chorus' actual network and, on the other hand, optimisations. WIK have not

[67] WIK Report at s 4.2.3.

[68] WIK Report at s 5.4.1.

[69] WIK Report at s 5.4.2 – 5.4.3.

[70] WIK Report at s 5.4.4.

been able to test the consistency of this, because the geospatial modelling is not transparent in the model.[71]

(b) the dimensioning of active equipment in the core may not accurately reflect expected customer demand.[72] In addition, the model does not appear to account for traffic demand for additional unregulated services. If included, these services would be excepted to deliver cost decreases through scale effects – without which the model is prone to an over-estimation of UBA costs.

(c) certain over- and under-estimations in fibre dimensioning, due to lack of efficient DWDM modelling in the core network.[73]

D4.3 Finally, as observed below in section I, the core network design is not optimised to best account for trenching costs. This, as WIK identify, has a significant impact on cost.[74]

D5 Required network efficiency gains missing from model

D5.1 Ensuring potential efficiency gains are captured in a TSLRIC cost model is critical. The Commission's task is to model an HEO: a failure to consider potential efficiency gains and cost improvements ignores an essential ingredient in the very meaning of a hypothetical *efficient* operator.

D5.2 The following potential efficiency gains, which are commonly included in TSLRIC models by other regulators, are identified by WIK as missing from the Commission's model:

(a) **changing MDF/ODF boundaries and modifying the number of ODFs/MDFs**, which is a routine component of scorched node / modified scorched node modelling, allowing the cost model to correct for certain inefficiencies that grow over time in the historic development path of a network. As set out above, this is exaggerated by the model's approach to network optimisation, which does not adequately reflect the efficiency gains possible in route length with a fibre MEA due to the differences in line length restrictions;[75]

(b) **in the case of the copper-based network, modifying the number and location of street cabinets**, reflecting the expectation that an HEO would optimise the number of cabinets and locations in order to meet its bandwidth expectations at lowest cost. This requires an efficient balancing between delivering the highest bandwidth performance while minimising trench costs (which WIK observe to be the key driver of efficiency savings);[76]

(c) **modifying core links (all NGN links)**, reflecting the expectation than an HEO would do so based on its full traffic expectations in order to benefit from the highest scale achievable. This should be the result of an iterative process in modelling, run until the

[71] WIK Report at s 4.2.7.

[72] WIK Report at s 4.2.7.

[73] WIK Report at s 4.2.7.

[74] WIK Report at s 4.2.7.

[75] WIK Report at s 5.6.1 - 5.6.2.

[76] WIK Report at s 5.6.3.

most efficient approach is found (as opposed to the simple geospatial computation adopted in the draft decision);[77]

(d) **passing street sections by feeder, FWA and core links, as well as and combining individual cables,** reflecting the ability of an HEO to reduce costs in this manner for cables, spare and unused fibres, routing, OPEX, chambers, sub-ducts, ducts, and trenches. This must also include, for example, including all cables in overhead where overhead is used to avoid running trenches for single cables and avoiding running multiple cables down the same street when a single cable would suffice (and reflects efficient practice of operators today);[78]

(e) **better accounting for joints, CTT, FAT, pits, manholes and chambers**, especially after taking into account optimisations to route lengths (which would reduce need for joints etc. proportionally). WIK could not verify if the model implementation appropriately shares or "co-locates" manholes for multiple cable scenarios;[79]

(f) **adopting modern trenching costs**, including the use of micro-trenching which is used today for UFB (and is common in European markets), which allows for lower network deployment costs. This is not included in the Beca report, despite Chorus itself using micro-trenching in its UFB deployment;[80]

(g) **combining lead-ins**, as described above at paragraph D3.3(b) above;[81]

(h) **efficient use of submarine links and microwave links**, reflecting the expected use of modern technology and network design practice by an HEO to reduce cost;[82]

(i) **considering utilisation rates for DSLAMs and the FDSs in the copper-based model,** which is required to reflect realistic (and ultimately efficient) dimensioning by an HEO so that it is able to handle new customers, single port failures and churn;[83]

(j) **consistency in spare capacity across copper and fibre cables**, with no justification provided for the absence of spare capacity being used for copper but not fibre.[84] In addition, WIK observe that cable spares are identified as 11% in the model documentation but are set as zero as an input parameter to the model: this should be corrected, but WIK conclude that distribution space capacity should be lower;[85]

(k) **considering requirements for network resilience**, reflecting an expectation that an HEO will include modern approaches network and system redundancies. WIK provide a

[77] WIK Report at s 5.6.4.

[78] WIK Report at s 5.6.5.

[79] WIK Report at s 5.6.6.

[80] WIK Report at s 5.6.7 and Section I 'Trenching costs' below.

[81] WIK Report at s 5.6.8.

[82] WIK Report at s 5.6.10 and 5.6.11.

[83] WIK Report at s 5.6.12.

[84] WIK Report at s 5.6.14.

[85] WIK Report at s 5.12.4.

series of examples of typical resilience design rules, including double-homed DSLAMs and ring network topology.[86]

D6 Non-network or common cost efficiencies ignored

D6.1 Finally, outside of the network costs addressed above, WIK observe that there has been no efficient consideration conducted for non-network or common overhead costs (which are instead drawn from Chorus' accounts) with no observable checks for efficiency.

D6.2 Instead, WIK note that the data room does not reveal all data provided by Chorus, making it difficult for parties to effectively engage, and that where data is available, it appears to be transferred directly from Chorus inputs to the model without adjustment.[87] While WIK have not been able to conduct a complete analysis of the non-network costs in the time and with the information available, but provide a number of examples of where a more comprehensive engagement between the regulator and the service provider enables a more accurate assessment of (efficient) non-network costs. For example, WIK refer to the allocation of sales and marketing staff to specific products or the allocation of IT solutions support staff to network related costs.

D6.3 More importantly, WIK observe that the top-down approach applied by TERA and the Commission risks reflecting costs which do not reflect an HEO. As such, WIK recommend a mark-up approach using national or international benchmarking. WIK's analysis of the mark-up included in the Commission's draft decision reveal a mark-up of 11.1% for UCLL and 29.9% for UBA, which WIK observe in both cases to exceed an acceptable level of efficiency in cost: other regulators apply mark-ups for non-network costs which usually do not exceed 10%.[88]

Recommendation 7	The Commission must ensure that the cost model includes all efficiency adjustments that an HEO would be predicted to undertake in deploying an MEA-network, as well as all non-network (common cost) efficiencies.

D7 Expected trench cost minimising by an HEO

D7.1 The Commission's model utilises a shortest path algorithm that is prone to over-estimate costs, because it fails to minimise trench route lengths overall. As WIK observe:[89]

> *An algorithm which optimizes the fibre (or copper line) routes to the local exchange (LEX) individually node by node as it is described in the TERA Model Documentation (see section 5.2.1) does typically not generate the most efficient civil engineering cost, because it does not construct a shortest trench length tree.*

D7.2 TERA accepts that this is likely to lead to inefficiencies, however proceeds with the "simpler" approach on the basis that an augmented cost-optimising approach is "generally not used by regulatory authorities in a TSLRIC context".[90] WIK reject this assumption, identifying the use of

[86] WIK Report at s 5.6.15.

[87] WIK Report at s 5.6.9

[88] WIK Report at s 5.6.9.

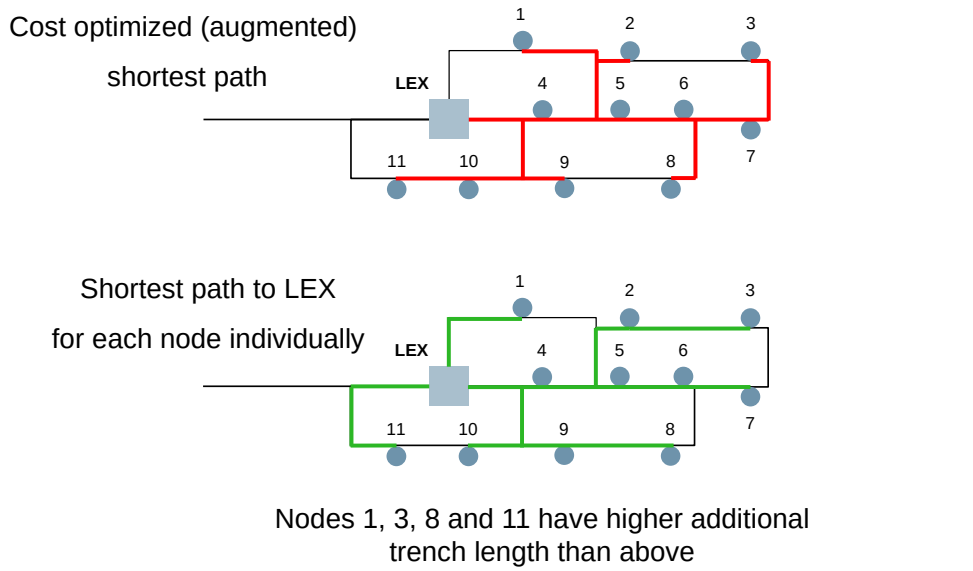
[89] WIK Report at s5.9.

[90] TERA Model Reference at 2.6.2.2.

such an approach by regulatory authorities in Germany, Switzerland, Austria and Spain.[91] Regardless of this, Vodafone submits that a cost-optimised, augmented approach is the only approach an HEO would be expected to deploy. While the calculation is relatively more complex, the alternative is significant avoidable civil and other costs. In our view, no HEO would conceivably undertake investment in such an inefficient manner.

D7.3 WIK demonstrates the potential cost-savings from this approach in Figure 5-4 of the WIK report:

Figure 0-2: Augmented vs. individual node shortest path



Nodes 1, 3, 8 and 11 have higher additional trench length than above

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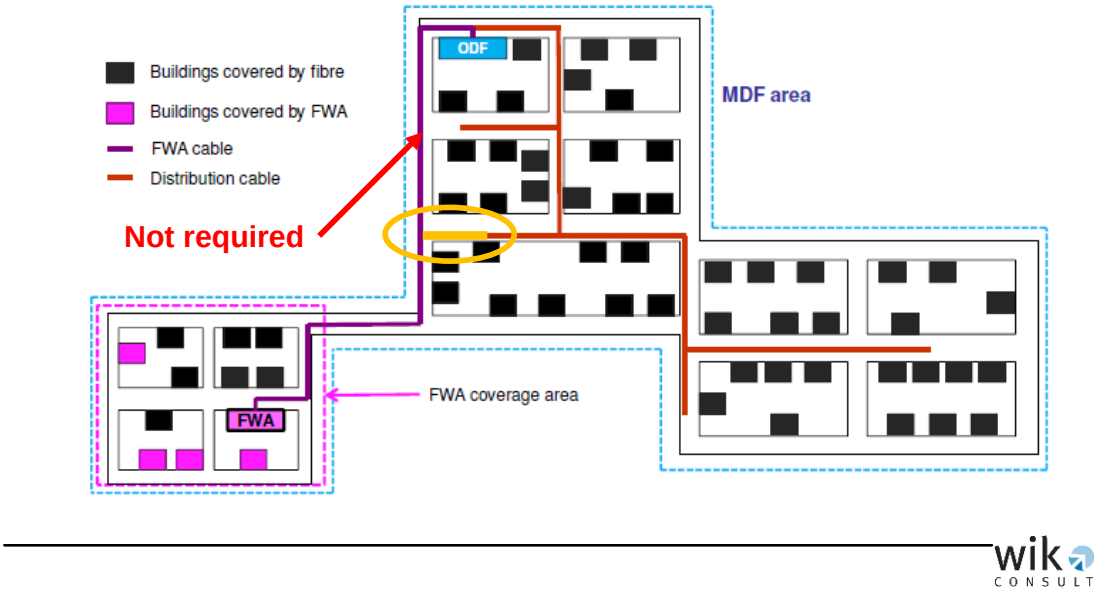
D7.4 Clearly an HEO would construct the "red" network: while certain individual nodes have longer trench lengths than when the shortest path algorithm is adopted, the overall result is a "shorter" network, at lower cost.

D7.5 Similarly, WIK observe that further cost savings are available to an HEO through optimising trenching not only across address points, but between the FWA network and the core network. This is demonstrated in Figure 5-5 of the WIK report, as follows:

[91] WIK Report at s 5.9.

Figure 0-3: Example of uncoordinated shortest path algorithms, resulting in inefficient trenching



Source: TERA, Model Specification, Figure 31, complemented by WIK

D7.6 This approach reflects expected behaviour of an HEO, and may be calculated (by HEOs and the regulator alike) using standard modern geodata processing systems.

Recommendation 8	The Commission's cost model must be guided by trench length optimisation to reflect efficient network deployment by an HEO.

D8 Inaccuracies in input parameters for network modelling

D8.1 The Commission's model overstates the efficient costs predicted for an HEO because of flaws in input parameters:

(a) **Equipment choices are not supplier neutral**. The equipment costs assumed in the model are based predominantly on data supplied by Chorus, which WIK observe to be eight years out of date. An HEO would of course conduct a tendering exercise in today's market (across multiple vendors) and is likely to achieve lower equipment costs than those on which the Commission's model is currently based.[92]

(b) **Many costs are based on list prices**. It is inconceivable that an HEO deploying a nation-wide, ubiquitous network would not receive volume discounts against list prices. WIK identifies a number of costs parameters which appear to reflect vendor price lists, which are simply not representative of predicted HEO costs.[93] In addition, WIK provides a detailed analysis of equipment costs, at 5.8.3, which highlight a number of prices which appear out of step with international benchmarks: for example, ducting price is up to

[92] WIK Report at s 5.8.1.

[93] WIK Report at s 5.8.2.

seven times lower in the Danish cost model than the Commission's model.[94] WIK similarly observes that the costs for manholes are over-stated compared to international benchmarks.[95]

(c) **Investment payment period unnecessary.** TERA assume that construction will take six months, which will also reflect the time between investment by the HEO and network revenue generation. We agree with WIK that an HEO would be expected to negotiate with its suppliers to align supplier costs with network operation (and therefore revenue generation).[96]

(d) **Many asset lifetimes are too short.** WIK observe that many of the asset lifetime input parameters are based on Chorus information with no adjustment. There are obvious flaws in this data: for example, the asset lives for copper and fibre cables are the same (20 years), when fibre cable lifetimes are generally accepted to be longer (many NRAs assume lifetimes of 30 to 40 years).[97]

(e) **Asset stranding assumptions are unorthodox.** NWS refers to the Commission's use of Chorus asset lives values, which appear to account in the model for a risk of asset stranding, as unorthodox especially in light of the Supreme Court's decision in *Vodafone v Telecom*[98] which found that it was not legitimate for Telecom (as it then was) to expect a return on the hypothetical asset base modelled by the Commission.[99] Moreover, the court considered that the Commission's refusal to alter its model assumptions in than case because of its mistaken belief that it would then need to allow compensation to Telecom for the effect of the change constituted an error of law.

(f) **Handover points overcharges.** WIK observe that handover charges included in the model are over-stated, and in any case may be higher than those expected from an HEO (based on an analysis of the input data included with the Commission's model).[100]

(g) **Power supply and cooling costs are inaccurate.** The model applies a fixed investment of NZ$100,000 for all exchange locations to take account of power supply and cooling costs. WIK conclude that this value has been derived from an analysis for four sample locations, which are not proven to be representative. We agree with WIK that this approach is prone to over-state costs.[101]

(h) Errors **in currency exchange**. WIK observe errors in currency exchanges from AUD and USD to NZD, which are prone to over-state costs reported in NZD.[102]

D8.1 In addition, many of the inefficient engineering decisions (discussed above) reflected in the model are also reflected in over-stated input parameters. For example, active electronic costs are

[94] WIK Report at s 5.8.3.

[95] WIK Report at s 5.8.8.

[96] WIK Report at s 5.8.4

[97] WIK Report at s 5.8.6

[98] 2011 NZSC 138 at [75].

[99] NWS Report at s 9.3

[100] WIK Report at s 5.8.12.

[101] WIK Report at s 5.8.13.

[102] WIK Report at s 5.8.14.

over-stated because the model is confined to a single configuration: as WIK observe, if a "small", "medium" and "large" option for active electronics were allowed (reflecting efficient investment) then costs would be reduced.[103]

Recommendation 9	The Commission must reconsider and adjust the input parameter values to correct for the errors identified by WIK.

E Fixed Wireless Access

E1 FWA modelling in the draft decision is insufficient

E1.1 We agree with the FTTH with FWA MEA that the Commission has adopted in the Draft UCLL Determination.

E1.2 TERA's access model is dimensioned to consider FTTH and FWA networks simultaneously. The Commission has not attempted to optimise the location, build specifications and coverage decisions of a HEO. We support WIK's conclusion that:[104]

> *The Commission has chosen a FWA footprint that is incompatible with its own TSLRIC principles. The FWA footprint is determined by exogenous principles and considerations and not on the basis of a cost optimization approach.*

E1.3 Adopting Vodafone's rural mobile sites built under the Government's Rural Broadband Initiative (and the coverage provided by those sites) as the rational coverage for the modelled network simply does not fulfil the TSLRIC standard. No assessment is undertaken as to whether the number and location of these sites are the result of coverage or profit optimisation. Where FWA is accepted (quite appropriately) as a valid component of the MEA, this is a required component of the cost model.

FWA modelling does not reflect expected HEO behaviour

E1.4 The Commission's decision to model FWA only at the edges of the network is inconsistent with the coverage a profit maximising HEO would achieve using FWA for reasons including:

(a) **The capability of LTE.** LTE is a superior technology and its improved performance in fade margin, data rates, latency, packet loss, failure rates, spectral efficiencies and the scalable bandwidth allowing improved coverage and cell edge data rates are ignored by TERA. Further, that 700MHz spectrum band enables better coverage and slow fading margins are lower in rural than urban areas is also ignored.

(b) **Artificially restricting FWA coverage to RBI.** As recommended previously by NWS: "*the relevant footprint for a FWA Modern Equivalent Asset (MEA) is considerably wider than the RBI footprint, particularly given the superior performance speeds available*

[103] WIK Report at s 5.8.11.

[104] WIK Report at s 4.2.6.

through LTE"[105] and yet the Commission's approach does not allow existing assets to provide service to customers an HEO would find viable beyond the RBI boundaries.

(c) **Focus on Vodafone coverage, while ignoring potential HEO coverage.** While LTE technology is chosen by the Commission, TERA has assumed coverage based on Vodafone's RBI sites rather than modelled the HEO's coverage areas. Vodafone's actual RBI sites were designed for 3G technology and spectrum bands higher than 700MHz, and so coverage assumed for a HEO using LTE technology in the 700MHz band is too conservative. It is disappointing that despite the Commission acknowledging these FWA technology assumptions "*will mean that both the performance and the coverage will be quite different to that currently achieved by Vodafone for RBI*"[106] this shortcoming exists in the model.

(d) **Artificially (and erroneously) limiting the capacity of individual sites.** In assuming one LTE base station with three sectors per site, and assuming limited capacity of these base stations, the Commission restricts the number of end-users any one sector can serve at 67. The remainder are served via fibre to the nearest exchange. Yet Vodafone's RBI network plan – so 3G technology, not even LTE – averages 157 customers per sector (assuming 3 sectored sites for comparability). The assumption of maximum 67 customers served per sector directly contradicts the Commission's own statement that '[for] *the FWA coverage areas we have ensured that 100% of customers within each FWA coverage area can be connected to the network'.*[107] TERA's calculations result in 74,633 dwellings being covered by 535 FWA sites – an average of just 53 sites per sector. Yet this is only 30% of the projected 250,000 homes to be served by Vodafone's RBI network.

(e) **Ignoring the potential cost-savings of deploying additional sites as opposed to additional FTTH.** A significant number of buildings which are currently within Vodafone's RBI region but outside Chorus' RBI, are assumed to be connected via fibre by the HEO and yet there is no consideration whether an HEO might deploy additional sites to connect via FWA those users. The use of distance from the exchange to determine the cost of a customer's connection is incorrect from a network planning perspective. The Commission's model connects clusters of buildings with FWA whilst assuming fibre to less densely located customers.

(f) **Ignoring lower-cost, capable microwave backhaul for FWA.** Microwave backhaul is ignored, despite the likelihood an MEA FWA would deploy this given currently the cost of Chorus-managed fibre backhaul is more than 3 times higher than the cost of a single hop microwave link.

(g) **Ignoring the benefits of mobile services which are also delivered by FWA sites.** Sharing of FWA sites with mobile services has not been considered, despite that being an obvious cost saving relevant to a HEO.

(h) **Adopting RBI specifications which are unlikely to reflect the costs faced by an HEO deploying a FWA solution as part of a nation-wide network.** The specification for sites

[105] Network Strategies, *UCLL and UBA FPP: consultation on regulatory framework and modelling approach*, 20 August 2014, page ii.

[106] Draft UCLL Determination at [604].

[107] Draft UCLL Determination at [595].

currently built under the RBI is not an appropriate representation of the specifications of FWA sites an HEO would construct. Current requirements allow for two antennae per operator per sector, and the structure's foundation must accommodate this equipment loading. On average across RBI sites, approximately 20% of site costs are sunk into site acquisition (lease and RMA compliance,) 40% on the site foundations and 40% with remaining costs addressing tower, cabinetry, fencing, mains power connection and associated professional services. Based on current costing information, Vodafone engineers have estimated that a single operator site could be acquired and built with costs approximately one third less than the current RBI Open Access build costs.

E1.5 The HEO is assumed to face spectrum fees based on spectrum prices of the last 700MHz auction, and these fees represent around 30% of the total FWA site cost in TERA's modelling. Firstly, there is no precedent for including spectrum fees in TSLRIC modelling. Secondly, if the Commission is to include spectrum fees, we believe the rates paid for spectrum usage rights by a predominantly fibre-focussed HEO would be significantly lower than the market rates paid by mobile operators for spectrum management rights covering the entire country. The latter reflect the revenue streams expected by mobile operators from their networks, including across urban areas. The former clearly does not.

E1.6 Overall, the assumptions made result in FWA coverage that is not consistent with a profit maximising HEO deploying a MEA network.

Discrepancies in existing FWA model

E1.7 We note several discrepancies between the Commission's draft decision and TERA's modelling:

(a) The Commission's network dimensioning is based on the number of existing buildings/dwellings within the TSO boundary. In-use address points are used as a proxy for potential demand, resulting in 1.87 million dwellings within the TSO-derived boundary. However when producing final cost-per user results, the total CAPEX and OPEX are divided by 1.76 million connections (the sum of copper, fibre and LFC customers) – a reduction of 6% in dwellings considered. This error must be addressed. Further, whilst the Commission states that '*FWA opex includes spectrum fees and maintenance opex (based on information provided by Vodafone)*'[108] is not consistent with TERA's statement that: '*Opex model is based on Chorus' 2013/2014 accounts*'.[109]

(b) The Commission states 67 end users per FWA coverage area, yet TERA models 67 users per sector, with three sectors per site.

(c) The Commission states LTE is modelled, yet TERA mentions both that the most advanced technology should be modelled, and states one LTE advanced base station at each FWA site, and states that the FWA technology should be 'LTE or LTE advanced'.[110]

(d) NWS asked the Commission to clarify whether LTE or LTE-A was modelled and the Commission responded that LTE-Advanced was modelled. Yet TERA's assumed peak

[108] Draft UCLL Determination at [345].

[109] TERA Model Specification, page 19.

[110] TERA Model Reference Paper, page 12.

throughput of 16,6666kbit/s is appropriate for LTE and not for LTE-A: the latter has higher throughput.

E1.8 In summary, the Commission's assumptions do not properly reflect rational HEO deployment choices:

(a) restricting FWA to RBI areas only;

(b) basing site location on Vodafone's existing RBI sites only, which ignores how a HEO would design it's FWA extension to a FTTH network and with no attempt at network optimisation;

(c) assumptions on how many users could be served per sector is too low for LTE-A technology and 700MHz spectrum, with profitable potential users are ignored; and

(d) microwave links are not considered, and consequently too much fibre is implied.

E1.9 Further issues include:

(a) an inefficient FWA network being modelled – inconsistent with an MEA;

(b) demand assumptions are inconsistent;

(c) copper network OPEX has been used in the FWA network; and

(d) spectrum fees are equivalent to those paid by mobile operators in a competitive auction for nation-wide spectrum, rather than an estimate of what would be paid by an 'access seeker' needing spectrum only in remote areas.

E1.10 These limitations lead directly to a significant under-estimation of the importance of FWA in the HEO's network, and thus a significant over-estimation of the HEO's TSLRIC costs. In areas where FWA deployment is the more cost effective connection option, the Commission must accept that FWA would be deployed by a commercially rational HEO.

E2 FWA modelling by NWS

Approach to FWA modelling

E2.1 We are aware that the Commission, and TERA, will not have had access to FWA network design and optimisation tools. However it would have been possible to have this work commissioned by independent expert radio engineers – cooperation of the mobile operators could have been assumed. Vodafone has consistently offered to assist the Commission with this work, including making available its tools (with appropriate protections for confidentiality in place) to Commission staff or its consultants.

E2.2 To accurately consider FWA deployment the Commission must give proper consideration to a FWA network design exercise.

E2.3 Vodafone does deploy FWA and therefore has the necessary radio engineering expertise and software to carry out this exercise. Therefore in conjunction with Spark, we have commissioned NWS to calculate the average cost per line for a FWA service, based on a sample of Exchange

Service Areas (**ESAs**).[111] NWS' objective was to calculate a FWA cost that can be compared to the fibre cost (in the Commission's model) to determine whether FWA would be the least-cost technologies for the specified ESAs. Vodafone has carried out FWA network design to find the number and characteristics of base station sites required to meet the demand for the ESAs selected by NWS. During this propagation modelling NWS worked in conjunction with Vodafone (and Spark) engineers to test every input into their modelling, and so create a model based on actual current MEA technologies and FWA network design. Some inputs (such as site locations) and assumptions, which are arguably irrelevant to an HEO MEA, have nevertheless been adopted in order to ensure this FWA exercise aligns with the analysis in the Draft UCLL Determination and TERA's modelling (and so can neatly link into TERA's existing model).

E2.4 The focus of NWS' model is regions outside the dense urban areas, so omitting Chorus Zones 1 and 2. Areas representative of Zones 3 and 4 were selected, and the sample size includes sufficient coverage of ESAs to ensure results are meet the statistical requirements for a 90% level of confidence (with an error margin of 10%).

E2.5 Eight areas from different parts of the country were selected to ensure diverse conditions are represented, encompassing a total of 74 ESAs. Geotypes relating to population density and terrain were used for Zones 3 and 4 equivalent to those used in the Commission's 2004 TSO calculations.

E2.6 NWS' FWA submission presents the modelling characteristics, approach and model inputs in detail.[112] In summary, the analysis is based on the following assumptions and practices:

(a) LTE for a 5 year period with no technology upgrades; 2x20MHz of spectrum is assumed in the 700MHz band (note, a conservative assumption as LTE-A would be yet more efficient); 250kbit/s throughput is assumed which is the Commission's average; and customer's capacity requirements are expected to increase by either 20% or 50%.

(b) only those buildings within the TSO, using the same building locations, and considering only ESAs with no unbundled lines (reflecting the Commission's conservative approach in this respect).

(c) Vodafone's existing RBI sites, plus any additional sites to provide service to customers outside the Vodafone footprint, are used. Using Vodafone's existing sites is again a far more conservative approach than the ideal of locating FWA sites based on optimising the HEO's network to all viable customers. NWS' approach was adopted primarily to ensure the FWA design and calculations can be appended into TERA's modelling. Whilst we have ensured NWS take an approach to modelling FWA that can work with TERA's current model, we nonetheless retain our view that in principle, a HEO that is not re-using existing sites would design its network based on reaching viable customers, rather than taking legacy systems into account.

(d) Radio propagation design was undertaken for the ESAs by radio engineers within Vodafone (and for certain ESAs by equivalent staff at Spark) using the same radio

[111] The sample areas are representative of geotypes defined for New Zealand.

[112] NWS FWA Report at s 3.

planning tools used for actual network design, by staff unconnected to this FPP project and with no prior awareness of the Commission's FWA approach.

(e) Radio propagation assumptions are as per an MEA.

(f) Infrastructure, radio equipment, any other equipment, backhaul (including repeaters), customer infrastructure was costed using current internal pricing information.

(g) Given the assumption of spectrum bandwidth is consistent with the Commission's approach, NWS have assumed revenue from co-location and the provision of other mobile services. Co-location on Vodafone's existing sites is the base case, with additional sites costed as greenfield site builds. Cost sharing attributes an extremely conservative 77% of the total site cost to FWA customers, with only 23% allocated to mobile customers.

(h) Network elements are determined by capital cost and capital cost trend, the financial and physical lifetime of assets, any spares, operational cost and the OPEX trend.

(i) A portion of the Commission's spectrum cost is assumed, by sharing the spectrum price paid across all customers to serve both mobile and potential FWA customers. Co-location revenue is assumed. Overhead and common costs are not included, as these should be shared across all fibre and FWA users. As NWS' model is designed to fit within TERA's fibre model this final cost allocation step can be carried out once the models are combined.

(j) Average cost across all geotypes was then calculated. Ideally, weighted average costs should be derived after classifying all ESAs by geotype but time did not permit this exercise. NWS would be happy to revisit this step and carry out a more detailed weighted averaging.

E2.7 The Network propagation design is described by NWS as follows:[113]

> *Radio planning was performed to ensure that the two criteria – coverage and capacity – were satisfied. Coverage sites were planned to cover 100% of customers using co-location on existing Vodafone sites if possible and adding new multi-access sites (to allow for co-location in the future) where required. In addition repeaters were added where there were only a few customers to cover and it was more economical to do so (rather than adding a new site).*
>
> *After ensuring 100% coverage, the capacity criteria were checked for all the customers, namely peak capacity of 5Mbit/s and average capacity of 250kbit/s per customer. When the capacity requirements were not met using the coverage sites, additional capacity was added. This was done by either upgrading existing sites (adding more sectors) or adding new single access sites.*
>
> *Two types of backhaul options are assumed – fibre and digital microwave radio/wireless (DMR). The backhaul for new sites was estimated based on the ratio of fibre and DMR backhaul for existing sites.*

Output of NWS' model

E2.8 NWS calculates a weighted average (for the eight areas) cost per customer of $26.96 per month for the first year (excluding non-network costs). NWS adopt TERA's non-network cost mark up of 11.78% for non-urban areas resulting in a FWA cost of $30.14 per customer per month.

[113] NWS FWA Report at s 4.1.

E2.9 Thus NWS's calculation of FWA cost is 37% lower than TERA's value of $47.73 per month for non-urban customers.

E2.10 TERA's national average is $28.22 per customer per month and is based on $20.63 for urban areas and $47.73 for non-urban (Zones 3 and 4) areas.[114]

E2.11 When NWS recalculate the national average cost (by assuming the same urban and non-urban ratio as TERA and $30.14 as the cost for non-urban areas), the national average result would be $23.29. This is a significant reduction in national cost, of $4.93 per customer per month.

E2.12 In contrast to NWS' approach, TERA's cost estimates for Zones 3 and 4 were derived with the inclusion of unbundled ESAs. Yet those ESAs are typically within the more densely populated 3a Zones and so we would expect the cost of service provision to be lower 3a Zones than in the more sparsely populated Zones with no unbundling that NWS modelled. This point is important, as the implication is that NWS' results should be regarded as an upper bound for all Zone 3 and 4 areas.

E2.13 NWS provide a useful comparison table, replicated as Table 1 below.

Table 1: Geographically averaged price for UCLL services

Monthly cost per line	*TERA*	*Network Strategies*
National	28.22	23.50
Urban	20.63	20.63[1]
Rural	47.73	30.86

1 TERA estimate used for urban cost per line.

Source: Commerce Commission and Network Strategies

E2.14 The Commission and TERA are assuming a fibre roll out that is too high, and underestimating the proportion of FWA in an HEO's MEA network.

E2.15 NWS's study follows a conservative approach to modelling FWA, and presents statistically robust and highly significant results that cannot be ignored.

E2.16 We agree with NWS' recommendation:

> [NWS] *believe that the issues that we have identified for optimal deployment with the Commission's existing FWA model implementation cannot be remedied within the Commission's existing approach. As such we recommend that the Commission adopts our model estimates for use in conjunction with its own model. These estimates would replace its draft model estimates for each ESA within Zones 3a, 3b and 4. This recommendation provides an immediate remedy for the issues we identified with the Commission's draft approach since the model estimates are based on actual radio planning designs. We note, however, that the margin of error of our estimates could be further reduced if further sampling were to occur, and recommend that the Commission considers extending our analysis in this manner.*

[114] Commerce Commission (2014), *Draft pricing review determination for Chorus' unbundled copper local loop service*, 2 December 2014, paragraph 10.

Recommendation 10	The Commission must employ a FWA network design and optimisation exercise consistent with a HEO serving all viable customers and reflecting a MEA technology deployment of FWA.
Recommendation 11	The Commission should adopt NWS's estimates for use in conjunction with its own model.

F Re-use of assets

F1 Overview

F1.1 The Draft Determinations model an HEO that deploys a network without re-using existing assets owned by other telecommunications providers nor those owned by other utilities. This applies to all levels of the fibre network as well as the FWA network modelled. The approach taken is inconsistent with:

(a) what an HEO would do;

(b) Chorus' actual deployment; and

(c) regulatory best practice identified in other markets.

F1.2 Vodafone has significant concerns with the use of optimised replacement cost (ORC) on fully depreciated assets, and the Commission's inconsistent approach by considering reuse in UBA modelling. We support WIK's analysis that:[115]

(a) **The absence of asset re-use is inconsistent with expected, rational HEO behaviour**. A profit maximising HEO would re-use existing assets in all areas in which re-use is lower cost than greenfield investments at ORC. Shareholders would not allow these significant cost savings to be ignored.

(b) **The use of the optimised replacement cost (ORC) methodology means Chorus is offered double recoupment for these assets.** The Commission applies the ORC approach to all assets regardless of whether these are replicable or reusable, meaning fully depreciated assets still in use are valued as if brand new. This means Chorus is being offered double recoupment for such assets. WIK highlight that this double counting is not a minor issue – double recoupment is related to most relevant parts of the existing asset base.[116] Taking into account that Chorus uses its assets to provide services beyond the scope of this regulatory exercise, WIK estimate the use of ORC on depreciated assets results in a threefold inflation of Chorus' book value of the relevant assets. This is a direct transfer to Chorus shareholders. This problem will worsen over time: Chorus' copper network will persist in areas with no fibre and so the proportion of fully depreciated copper assets will increase, and so too will these double counting transfers to Chorus.

[115] WIK Report at s 1.1.2.

[116] WIK Report at s 1.1.2.3.

(c) **Re-use of duct and trenches is the norm and not an exemption in fibre roll outs.** Re-use of assets may also mean the use of spare capacity in existing assets, rather than deployment of new assets within existing channels.

(d) **The Commission's draft approach is inconsistent with regulatory best practice**. The European Commission recommends that NRAs '*should include any existing civil engineering assets that are capable of hosting an NGA network. Therefore, then building the BU+LRIC model, NRAs should not assume the construction of an entirely new civil infrastructure for deploying an NGA network.*'[117]

(e) **The Commission's approach is also inconsistent with statements made by Chorus itself on its focus on asset re-use as it deploys the UFB network**. For example: '*Wherever economically viable existing trenching will be used*', '[w]*herever economically viable the existing copper connection 'lead in' duct or pole infrastructure will be utilised* and '[w]*e'll be reusing as much of the existing network as we can for the UFB deployment and identifying opportunities to work with councils and utilities to reduce deployment costs is something we're really focussed on. This can involve trench sharing or linking with footpath programs to avoid reinstatement costs'.*[118]

F1.3 By ignoring the potential for asset reuse, the Commission is not modelling an efficient operator. Chorus itself has deployed fibre along the existing network nodes of the copper network and so can re-use existing node locations, buildings, ducts, trenches and any existing fibre cables. We recommend the Commission consider the fibre deployment strategies of Swisscom (who is compelled to re-use the electricity network infrastructure), KPN and Vodafone Ireland's JV with ESB described in the following section of this submission.[119]

F1.4 The Commission must include re-use of assets. Given the difficulty of using a dual valuation methodology, we recommend that the Commission adopts WIK's recommendation of retaining:[120]

> *[…] its ORC approach for all assets but apply a general deduction factor for the re-use of assets reflecting the difference between brownfield and greenfield costs of deploying a new infrastructure […] in the range of 20% of the investment value.*

F1.5 Finally, the Commission's assumption of asset reuse in the UBA calculation is in direct contrast to the decision not to consider re-use for UCLL modelling, and so leads to a further inconsistency in the approach to determining an MEA across UCLL and UBA. The Commission must assume re-use in all feasible areas.

F2 Aerial deployment

F2.1 We agree with the Commission's decision to consider EDB information on aerial infrastructure as "*a good proxy for where a hypothetical efficient operator would seek to deploy its network aerially*"[121] and refer back to NWS' earlier submission demonstrating network deployment by EDBs

[117] European Commission Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (11 September 2013) C(2013) 5761 at clause [32]
[118] Transcript from Chorus Investor Day, May 2012, page 11 https://www.chorus.co.nz/investor-information/presentations/2012, https://www.chorus.co.nz/file/48846/investor-day-other-presenters.pdf.

[119] See section F2 'Aerial deployment'.

[120] WIK Report s1.1.2.5.

[121] Draft UCLL Determination at [610].

examined is dominated by aerial infrastructure.[122] However we do not agree that the Commission's use of Chorus data for some calculations is appropriate.

F2.2 The Commission assumes aerial deployment for distribution cables at 36%, and for service lead-ins at 49%. The latter assumption is based solely on EDB information, however the calculation for distribution cables is based on information from both EDBs and from Chorus.

F2.3 NWS sought to replicate the Commission's calculations and could not.[123] Instead, they infer that the 36% was arrived at as an average of Chorus' lower limit target of 20% aerial deployment in UFB areas, and the 51% of EDB low voltage networks that are aerially deployed. Chorus' lower limit target relates to urban areas. However both NZ experience of EDBs in rural areas and fibre networks deployed overseas are strong evidence that a HEO would at the very least deploy a far higher proportion aerially in rural areas. Thus inclusion of Chorus' 20% target in the estimate if aerial deployment is inappropriate. Moreover, the inclusion of Chorus' urban target and exclusion of information from other LFCs - such as Northpower (at 60%) - biases the Commission's calculation of the proportion of aerial deployment downwards.

F2.4 Our recommendation is that the Commission use only the EDB data to determine the HEO's aerial percentages. As explained by NWS: "[t]*his is consistent with a rational profit maximising HEO that would be expected to not only deploy its distribution network based on the electricity network but would likely share resources and infrastructure with EDBs.*"[124]

F2.5 NWS refer to overseas assessments relevant to aerial deployment proportions:

(a) Deloitte Business Consulting on Romania: Distribution network from 65% to 80% and drop wire from 95 to 100%;

(b) WIK for ECTA: 0-40% in urban areas and 60% in rural areas; and

(c) Eastern Caribbean Telecommunications Authority: 60%.

F2.6 Vodafone Ireland has entered into a joint venture project with a leading Irish sustainable energy provider ESB to deploy a 100% fibre-to-the-building network. This is a perfect example of a MEA fibre network deployment, a EUR450million project allowing broadband speeds from 200Mbps to 1000Mbps.

F2.7 The network will deploy along the ESB's nationwide electrical infrastructure:

> *Ireland will also become the first country in Europe to utilise existing electricity infrastructure on a nationwide basis to deploy fibre directly into homes and businesses, initially reaching 500,000 premises in 50 towns. The fibre will be deployed on ESB's existing overhead and underground infrastructure, ensuring a fast and cost efficient roll-out to every county in Ireland and reversing the digital divide between the capital and regional towns.* [...] *This fibre infrastructure will use ESB's existing electricity infrastructure, maximising the use of state assets to the benefit of Irish society.*[125]

[122] Network Strategies, UCLL and UBA FPP: consultation on regulatory framework and modelling approach, 20 August 2014.

[123] NWS Report at s 5.1.

[124] NWS Report at s 5.2.

[125] ESB Press release: ESB and Vodafone to invest €450 million in 100% fibre broadband network, at http://www.esb.ie/main/press/pressreleaseWS.jsp?id=4074

F2.8 The cost efficient fibre network will:

(a) deploy central offices for fibre network at ESB's existing medium voltage stations for electricity network;

(b) collocate fibre street cabinets with medium to low voltage electricity transformers;

(c) use electricity distribution points as distribution points for fibre to the premises; and

(d) utilise the ducted, aerial and buried electricity lines infrastructure to deploy the fibre cables.

F2.9 The proportions of the Vodafone-ESB network that will be deployed by aerial and ducted (re-using assets) and via buried cable are detailed in NWS' confidential submission.

F2.10 Hence fibre deployment can not only use the electricity overhead and underground infrastructure to provide a cost effective network but can also extend the benefits by sharing other resources and collocating equipment on sites of electricity network providers.

F2.11 We recommend that the Commission reassess its treatment of inputs into calculating the proportion of aerial that a HEO would deploy. The assessments of overseas regulators would point towards the actual aerial proportion of our EDB networks to be the accurate indicators of a HEO's aerial network.

F3 Further sharing of assets

F3.1 Whilst TERA's Model Specification states that underground infrastructure is internally shared with the core network, WIK have found that such sharing has not been correctly implanted within the model, and highlight that there is no sharing between (i) the underground FWA and underground SLU backhaul infrastructure and (ii) the overhead distribution and feeder cables, despite the backhaul cables being feeder cables too.[126]

F3.2 While aerial deployment is considered, the TERA model does not consider underground sharing with other utilities. As WIK identify, this omission cannot be appropriate for a MEA HEO:[127]

> [...] *even if such sharing would not exist an HEO in a forward looking perspective would make use of it. Sharing with other infrastructure owners is:*
>
> - *State of the art in other jurisdictions,*
> - *A win-win situation for both cooperating operators and of more importance in competitive markets due to the higher pressure of saving cost due to the lack of guaranteed monopoly returns even for the ducts managed inefficiently,*
> - *An option a new HEO would try to exploit.*

F3.3 It has not been feasible to test the impact of assuming greater shared infrastructure within TERA's model. Therefore WIK have assessed the impact of greater sharing using cost savings of 5-30% based on estimates derived in their own similar cost models for other networks. New Zealand is sparsely populated compared to other countries, with lower density in urban areas and so we

[126] WIK Report at s 5.11.1.

[127] WIK Report at s 5.11.1.

expect the potential cost savings from sharing infrastructure to be closer to or above the higher end of WIK's range. The impact on UCLL costs of a 30% reduction is 7.9%, so a material impact from correcting this one assumption alone.

F3.4 The Commission has also not considered sharing of FWA and SLU backhaul cables in the feeder network segment. WIK argue that both cables are over-dimensioned, and that a HEO would combine these into one fibre feeder cable at each street segment they pass.[128]

Recommendation 12	The Commission must ensure the HEO is modelled as reasonably exploiting all feasible opportunities to share infrastructure within its own network, with other telecommunications providers and with other utilities.
Recommendation 13	The Commission must avoid double counting via its ORC accounting for all assets and consider WIK's suggestion of a general deduction factor for the re-use of assets in the range of 20% of the investment value.
Recommendation 14	The Commission should assume aerial deployment based solely on the aerial network proportion of New Zealand's EDBs and include sharing of further infrastructure with the EDBs.

G Demand

G1 Demand is relevant initially for the Commission's dimensioning of the HEO's network, and secondly as the denominator in the cost allocation exercise. The Commission has made a number of assumptions that under-estimate demand, leading to an over-statement of the HEO's per line costs.

G2 Demand is a material factor in the TSLRIC calculation. Notwithstanding the very real limitation on our ability to carry out sensitivity testing of the demand assumptions - caused by the lack of a demand input function into TERA's model that can be varied - NWS have estimated that correcting demand assumptions would create a 9% decrease in per line costs:[129]

> *So is it possible to quantify the impact on the model results? If we assume annual growth in demand of 1.5% (noting that Statistics New Zealand estimated population growth of 1.6-2% for 2015, and 1.1-1.6% for 2016[130], then over the period to 2020 there will be a 9.3% increase in lines from the 2014 level. To set a lower bound, if we assume costs are constant (which is obviously not appropriate), then with this very modest increase in demand the cost per line would decline by 8.5% by 2020. If we assume annual growth in demand of 2% (which given the economic situation is not unreasonable), then the cost per line would decline by 11.2% by 2020. Clearly if we relax the assumption of constant costs the true decline would be lower, but on the other hand these estimates do not consider the possibility of fibre stimulating greater demand. Thus we can conclude that a ballpark estimate would be a decrease in cost per line of around 9%.*

[128] WIK Report at s 5.11.2.

[129] WIK Report at s 2.5.

[130] Statistics New Zealand (2014), *National Population Projections: 2014(base)–2068,* 28 November 2014.

G3 This is significant. This section contains an overview of our concerns around demand, and our recommendation on amendments the Commission and TERA can undertake.

G4 The use of the 2001 TSO network as a starting point seems overly simplistic. Given the rapid changes in technology, we believe it would be logical for the Commission to count all demand connections that a HEO would find economical to serve. This would include both new connections within the TSO boundary, and beyond: with the use of FWA in more remote areas, it is likely that the economically served footprint would in fact be considerably larger than the 'TSO-derived' footprint. Further discussion of the Commission's treatment of FWA is in section E of this submission.

G5 Within the network footprint, the Commission then must establish the demand that will be met by the HEO. The Commission assumes all UFB demand would be met by the HEO – we agree with this. Existing demand for HFC services is excluded from the cost allocation process, which appears reasonable where double counting of locations would otherwise occur, but does not seem reasonable for HFC customers that are connections to premises established more recently than 2001. Whilst in the real world such new connections might be with a HFC, in the Commission's hypothetical exercise the HEO can be expected to have a network large enough to connect some or all of these customers. The Commission's assumption of no migration between HFC and other networks is flawed: we cannot assume no churn.

G6 The Commission includes demand for FWA RBI within UCLL demand, and not within UBA demand. For more on the significant inconsistencies across the MEA networks assumed for UCLL for and UBA see section C of this submission.

G7 The Commission assumes a HEO with instantaneous full uptake and a fully-loaded network. We agree this is the correct hypothetical construct as a starting point. However the assumption of constant demand over a five year period is incorrect. Whilst the HEO is a hypothetical construct, we do not agree with the implications of the Commission's constant demand assumption – either that the HEO would not face a growing NZ population, or the HEO would be ineffective competing with alternative providers and would gain no share of new connections resulting simply from population and economic growth.

G8 The Commission's Annual Telecommunications Monitoring Reports shows stability in the number of fixed lines since the late 1990s. However, between 1999 to 2014 the number of households has increased by 19.5%,[131] which clearly implies fixed-mobile substitution is occurring. Despite this trend, the Commission states that it does not include mobile or non-RBI FWA substitution. Yet this statement is inconsistent with the approach taken, as the Commission's assumption of constant demand for UCLL and UBA implies significant increases in fixed-mobile substitution. Fixed mobile substitution is an important factor in demand projections, and so should be explicitly considered.

G9 The Commission's starting point for demand is the CoreLogic database, used to estimate the location of buildings. We query why the Commission has used this database, rather than information on the location of actual fixed line connections, which would be data Chorus (and other fixed operators such as the HFCs) must be able to provide. The CoreLogic database is current in 2014, which means by 2020 it will be 6 years out of date. Looking forwards, population

[131] *ibid.*

growth can be expected to result in an additional 115,000 households between 2014 and 2020. We note also NWS' discussion of trends towards more urban in-fill housing and multi-dwelling units, and medium density business developments.[132]

G10 By ignoring these expected demographic changes, the Commission's constant demand assumption implies that all growth in telephony connections will be mobile-only, or fixed connections on networks other than the HEO's. Yet also on the supply side, the theoretical world of the HEO will also have more fibre availability than present reality, and so the Commission's assumption implies greater availability will have no effect on the decision to retain or acquire a fibre connection. All these implications seem illogical.

G11 Whilst we note NWS' recognition that building in population growth to a geospatial model such as TERA's is difficult, we nonetheless believe the Commission's assumption of constant demand is wrong. NWS' summary of the implications of the Commission's constant demand construct is important:[133]

> *Within the hypothetical* [constant demand] *universe:*
>
> - *mobile-only households will comprise more than one-fifth of all households by 2020*
> - *any population growth will be absorbed by greenfields developments*
> - *there will be no further high or medium density developments, or infill projects, in established areas over the period 2014 to 2020, and thus population (and line) density will remain static*
> - *the increasing popularity of high bandwidth applications and cloud services will have no effect on demand for fibre/UFB services*[134]

G12 We strongly recommend that population growth projections should be built into an assumption of increasing demand, at the very least for the main urban centres. By choosing not to do so, the Commission is allowing an overestimation of the HEO's per line, and thus arrives at inflated wholesale prices.

G13 The Commission's demand explanation is inconsistent with TERA's modelling documentation. The Commission explains the relevant network footprint as being based on a slightly larger area than was bounded by Telecommunication Service Obligation (TSO) services, or network coverage as at 2001. There are remote connections that fall outside this footprint: about 6.4% of total connections. While the demand and operating costs of remote connections are included within the model, the capital costs are excluded, and it is assumed that any capital costs for the remote connections are fully met by the end user. However TERA's Model Reference Paper appears inconsistent with the Commission's approach, as it states: '*in the base case scenario, only the areas inside the TSO-derived boundary are taken into account to calculate the results*'.[135] Yet in contrast to the model documentation, TERA's model appears to follow the Commission's approach.

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[132] NWS Report at s 2.3.

[133] *ibid.*

[134] NWS Report at s 2.5.

[135] TERA Model Specification, page 77.

G14 Demand figures vary across the different modules of TERA's model. The access network is dimensioned to 1,994,654 address points, or 1,815,420 buildings. However in its total cost allocation, WIK have highlighted that TERA uses a different number of connections.[136] The difference cannot be explained as simply addresses outside the TSO boundary.

G15 The network has been dimensioned to over 113% of actual demand and so rather than being fully loaded, it is over-dimensioned. TERA should use Chorus' actual connections as the starting point for 2015 demand, and in addition to UCLL, UBA and UCLF should include all services that use the network, for example leased lines, bounded lines and special data access line services.

G16 Further deficiencies highlighted by WIK include:

(a) the use of a non-transparent (and invalid) benchmark for the percentage of the access network length that is shared with the access network[137]

(b) the lack of adequate demand estimation for leased lines. The equal weighting of leased lines, bitstream and voice when allocating costs for the network segment between the local exchange and the parent FDS is simplistic. Instead, the relevant leased line demand could have been endogenously derived within the model;

(c) the lack of clarity on how fibre demand correlates to infrastructure including FTTH fibres or copper backhaul segments for UCLL to the local exchange;

(d) while voice services carry one third of the costs from local exchange to the FDS, there are no costs of the feeder segment from street cabinets to local exchange allocated to voice services;

(e) international leased line termination is excluded despite these services using a share of the core network; and

(f) lack of transparency on the source of the 3% discrepancy in copper connection numbers between those provided by Chorus and the connections in the model.

G17 Overall, the consistent under-estimation of demand leads to a lower than appropriate denominator in total cost allocation and thus a significant over-estimation in TSLRIC prices.

Recommendation 15	The Commission must reconsider demand assumptions. Customers that a profit maximising HEO would find viable to serve (e.g., via FWA) should be included. Population growth projections must be built into an assumption of increasing demand. Demand figures should be consistent for network dimensioning and allocation of total costs, or any difference explained. All services that rely on a specific asset or network segment should feature in the cost allocation exercise.

[136] WIK Report at s 5.14.1.

[137] WIK Report at s 5.14.4.

H Price trends

H1 The Commission's approach to UCLL and UBA price trends varies across the assets and costs:

(a) CAPEX for active assets – price trends based on international benchmarks;

(b) CAPEX for passive assets – price trends determined by a so-called 'cost escalation' approach using the Consumer Price Index (CPI);

(c) labour-related OPEX – price trends determined by a cost escalation approach using the Labour Cost Index (LCI);

(d) non-labour related OPEX – assumed to be constant over the regulatory period; and

(e) currency conversion using Purchasing Power Parity (PPP) rates, assumed to be constant over the regulatory period.

H2 The Commission's price trends are likely to overstate costs. Vodafone recommends the following corrections be made:

(a) **Update and correct benchmark data, which is significantly out of date:** Australian data, that is over five years old, should be omitted from the set of benchmark comparators. Information used within the TERA model, derived from the Norwegian regulator's core network model and from the Swedish PTS model, is not the most recently available. TERA did not include Swedish benchmark data for power and air conditioning. We recommend this be included, which alone would amend the average price trend for power from 0.8% to 1% and for air conditioning from 0.5% to 0.8%.

(b) **Adjust cost escalation approach to reflect NZIER forecasts and remove over-estimation in TERA model:** We support NWS's concerns around the term 'cost escalation' approach. This label masks the fact that if input factors considered are reducing overall, the price trend determined will also be reducing. We support the Commission downscaling its use of this price estimation method. However, whilst the Commission has obtained independent forecasts from NZIER for CPI, LCI, aluminium sheeting and fabricated steel (and has stated that historical trends were only used as a cross-check) NWS confirms that TERA has not actually used the NZIER forecasts in its modelling. Instead TERA based price trends on a compounding annual growth rate (CAGR) that is calculated within the model, meaning price trends are based on historic data, not the NZIER forecasts. As shown by NWS, the above concerns lead to over-estimation of any network element with a labour component or for which the default CPI is the price trend applied.[138]

(c) **Correct problems with CAGR calculation approach:** The calculation of CAGR includes inconsistent start and end points for CPI and GDP time series, as well as apparent errors in the LCI start-point and endpoint (calculating a CAGR over 20 years using more than 20

[138] NWS Report at s 6.2.

years' data). These lead to an overstatement of annual growth, and therefore cost over-estimation.

H3 Our consultants identify the following specific flaws in price trend assumptions, which must be corrected to reflect appropriate HEO cost assumptions:

(a) **The +4.19% trend for fibre-optic cables is unreasonable**. The dataset used for projections for fibre-optic cabling includes cost information on copper, which due to the volatility of copper, is inappropriate. Denmark, Norway and Sweden have decreasing price trend for fibre-optic cables. We recommend the Commission benchmark on the Scandinavian models.

(b) **The use of historical growth rates for both populations and buildings parameters over-estimates growth**, resulting in a 2019 population 60,000 higher than if forecast growth rates were used. TERA has also made an error in calculating the building growth rate: the figure used is the sum of households in the Southland region, North Island, South Island and New Zealand, which is over twice the number of New Zealand households. This error must be corrected.

(c) **Current conversion assumptions are inconsistent**. Currency conversions appear based on OECD PPP rates, with the 2013 rate being held constant for future years. NWS identifies inconsistencies in TERA's currency conversion calculation sheets, using PPP rates that have been divided by market exchange rates, and thus which are not comparable to the OECD rates.[139]

(d) **Lower growth for transport ways and pipelines should be given greater weight in the model.** BECA propose price trends for ducts and trenches, and it is unclear how BECA arrived at its inflation forecast of 3%. This appears weighted towards the annual growth rate at June 2014 for earthmoving and site works. NWS submit the lower growth for transport ways and pipelines should be given greater weight, and note their concern that the use of BECA's price trend data in TERA's model includes the effect of price inflation due to the Christchurch rebuild. This is an inconsistent approach to, for example, demand estimation, where care is taken to avoid misestimating due to the population movements since the earthquake.

H4 WIK's submission highlights the use of efficiencies achieved via new technologies such as micro trenching, and recommend a price trend of 1% rather than 3%.[140]

H5 We recommend that the Commission revisit this section of the modelling and ensure that its decisions are accurately reflected in TERA's modelling, calculation errors are corrected and reliable independent forecasts are more extensively used.

[139] NWS Report at s 6.3.

[140] WIK Report at s 2.6.

Recommendation 16	The Commission must remove out-dated price data from price projections and use current versions of similar regulatory models. TERA should use NZIER's price projections rather than historical growth rates, and correct simple errors in the CAGR calculation and in the building growth rate calculation. Price projections for copper should not influence the projections for fibre-optic cables and the influence of the earthquakes on price trends for ducts and trenches should be removed.

I Trenching costs

I1 Potential in the Bell-Ducat approach adopted

I1.1 Trenching forms a significant proportion of the HEO's network deployment cost. Trench distances are determined by assumptions made at the stages of network design, so network dimensioning, and the proportions of new trenches that the HEO would need to dig, rather than sharing existing ducts. Our submissions on these steps are in section E. This section focusses on the Commission's approach to estimating trench costs.

I1.2 Terrain and labour costs influence the costs of trenching. We support the Commission's use of local engineering experts Beca, and support Beca's use of the soil and rock categories developed in the context of the TSO, the Bell-Ducat system.

I1.3 However, the Bell-Ducat analysis focussed on rural New Zealand, and Beca itself notes that further work would need to be undertaken to extend the classifications to urban and suburban areas. [141] In the absence of such analysis, Beca has instead made simplistic blanket assumptions that urban areas are all one category of soil type: compacted fill.

I1.4 The modelling information provided by the Commission has not been sufficient to allow our experts to test Beca's exercise of mapping soil categories to Landcare New Zealand classifications, nor the mapping of trenching techniques to the terrain categories. As such we do not believe effective consultation is taking place on this aspect of the Commission's analysis.

I2 Further concerns with BECA analysis

I2.1 Further concerns with Beca's analysis include:

(a) *The information gathered:* Beca's request to contractors was for 'indicative, cover all rates'.[142] This request lacks specificity. Rather than approaching contractors – who are unlikely to be ambivalent about providing such commercially sensitive information – the Commission (or Beca) should have compelled information on trenching contracts from trenching 'customers' – the utilities.

(b) *Disregarding the HEO's scale and purchasing power:* Efficient costs for trenching are based by TERA on information provided by Beca. However we are concerned that Beca's

[141] Beca Report, page 4.

[142] Beca Report, page 11.

own assumptions result in drilling contract prices being as much as 20% higher than an efficient operator could achieve. Beca themselves report that trenching contractors highlighted the purchasing power of Chorus as being influential on negotiated trenching rates, with rates for Chorus "*as much as 20% lower than their normal tender pricing*".[143] However Beca also state: "[w]*e wish to emphasise that this discount has not been taken into account.*"[144] Beca should have taken this discount into account. Moreover, the Commission and TERA should have calculated that the HEO would have a nationwide network similar to Chorus' and so would have at least the same purchasing power as Chorus when negotiating contracts with trenching subcontractors. WIK also criticise the lack of consideration of purchasing power and states '*in other countries large scale constructors would work at lower prices than these* [mid-sized or small] *local constructors.*'[145]

(c) *Omissions:* The potential use of thrust pits to deploy chambers appears to have been ignored. The geological information also appears to have excluded road cuttings or embankments, which allow for cheaper trenching. Micro-trenching, as used by Chorus already (and as used by European operators) and therefore relevant to a MEA HEO would reduce trench costs by 10-20%, is ignored.[146]

(d) *Absence of forward looking costs:* Beca also use historical pricing estimates derived from four open trenching, directional drilling and thrust boring tenders spanning 2008 to 2014. However the HEO cost modelling should be based on forward looking costs.

(e) *Inflating labour rates due to the earthquake is inconsistent:* Beca have derived national trenching and ducting rates, and regional variations – upper and lower ranges – around the national rates. Rates for Christchurch and Ashburton are 15-20% higher than the national rates, and BECA also state clearly that the effect of the Christchurch rebuild has created a premium on labour rates in the South and lower-North Island.[147] Thus Beca's inputs are inconsistent with the Commission's own statements that the HEO would not face such constraints: "we can assume there are no resource constraints".[148] Further, the Commission's own treatment of the impact of the earthquake on customer locations within its assessment of customer demand was careful to neutralise the impact of a moving population in reality on the hypothetical world of the HEO. That the trenching cost portion of the TSLRIC calculation does not treat earthquake-related constraints similarly creates an internal inconsistency in the Commission's approach to the HEO's environment.

12.2 We recommend the Commission engage Beca to extend its initial analysis to:

(a) map soil categories in urban areas and repeats the mapping exercise with more accurate terrain information;

[143] Beca Report, page 9.

[144] Beca Report, page 9.

[145] WIK Report s 5.8.6.

[146] WIK Report s 5.8.6.

[147] Beca Report, page 8.

[148] Draft UCLL Determination at [157]; Draft UBA Determination at [127].

(b) adjust trenching costs using a 20% discount for the HEO's purchasing power;

(c) estimate forward looking costs rather than historical; and

(d) revise labour rate assumptions to remove earthquake-related contractor-price inflation.

I2.3 In addition, the Commission must ensure that the information on Beca's mapping exercise, which NWS have not been able to test, is available in the next round of consultation.

I2.4 The Commission should commission an extended analysis of trenching costs, using more detailed information on terrain and more accurate and current cost information. The purchasing power of a client tendering a contract for nationwide deployment must be included.

Recommendation 17	The Commission should commission an extended analysis of trenching costs, using more detailed information on terrain and more accurate and current cost information. The purchasing power of a client tendering a contract for nationwide deployment must be taken into account.

J Subsidies

J1 The New Zealand Government's broadband strategy includes subsidising the roll out of FTTH in most areas via the UFB initiative, with FWA in rural areas via the RBI.

J2 While we agree that the technology choices are those that a HEO would adopt, we do not agree that the exact roll out plans are those a profit maximising HEO would decide upon in the absence of government intervention. The Commission rejects the use of the Depreciated Optimised Replacement Cost (DORC) methodology used by European regulators to reflect the usual European government strategy of incentivising, rather than subsiding, UFB investments. Therefore it logically follows that the New Zealand HEO would sit within the current UFB policy framework, and so similarly to Chorus, the HEO would be the recipient of government subsidies to enable fibre coverage equal to the currently planned UFB roll out, so beyond the boundaries that a rational profit maximising HEO would choose to deploy absent Government intervention.

J3 The Commission has characterised the HEO as deploying fibre more extensively than the UFB footprint without receiving any subsidies. This simply cannot be logical. Had fibre roll out been profitable over this area, the UFB subsidy scheme would not have been necessary.

J4 Instead, we believe that without subsidies, a rational profit maximising HEO would deploy fibre over an area smaller than the planned UFB footprint, and deploy FWA over a greater area than the current RBI. FWA coverage would reach 'back' into some of those areas in which Chorus is deploying fibre. The Commission must, in its hypothetical construct, allow government subsidies to the HEO in order to attain the required fibre roll out. Similarly, the FWA roll out is unlikely to be achieved absent subsidies.

J5 For UCLL, the Commission assumes capital connection contributions from customers outside the TSO footprint. However in reality new customers also within the TSO footprint must:

(a) provide an open trench on their property; and/or

(b) contribute $195 towards the cost of a standard lead-in; or

(c) contribute $195 plus time and materials for any distance over 100m.

J6 These lead-in costs can be significant. WIK highlight that for a copper access network, an aerial lead-in share represents 17.1% and for the fibre network, represents 26.3% of total CAPEX. Thus neglecting to account for these contributions will create a significant double recovery of costs. WIK also highlight that '*although TERA's model foresees the option to exclude the connection revenues and the cost for non-standard lead-ins, these options are not activated for the actual cost calculation*'.[149]

J7 For UBA the Commission appears to be removing implicit RBI subsidies. However NWS report that whilst TERA have removed over $15m from capital costs this is not transparent and so they have not been able to trace or confirm the TERA estimate.[150] WIK highlight that the Commission only considers capital cost for DSLAMs and active cabinets deployed by Chorus under the RBI initiative, thus ignoring subsidies for other incremental infrastructure network elements and also ignores subsidies to Vodafone that are relevant in considering the 'world' of the HEO. Both NWS and WIK raise concerns on the treatment of DSLAM costs in the capital cost calculations, as there is no direct subsidy for DSLAMs paid though the RBI.[151]

J8 NWS have attempted a broad brush calculation of the government subsidies a HEO could be expected to receive:[152]

> *Ideally an economic approach should be used – as would an HEO in developing its own business case – however the focus of an HEO is likely to be on areas with greater population densities than the more lightly populated small towns and rural areas. We have therefore assumed that without any subsidies, the HEO would deploy fibre only to the 13 largest cities and towns, including in the LFC areas. These cities and towns comprise just under 65% of the New Zealand population[153], and include every city of more than 40,000 people. By comparison the UFB subsidy aims to extend fibre to 75% of the population.* [...]
>
> *We estimate the potential subsidy for the HEO to be $813 million, to extend fibre from a baseline coverage (in the absence of the subsidy) to the fibre coverage of the Commission's model, and assuming that the HEO would receive a similar subsidy ($1118 per premise passed) to that of Chorus.*

J9 The Commission must either:

(a) abstract entirely from the New Zealand situation and assess the actual footprint of fibre and FWA a profit maximising HEO would choose absent any government policy or incentives; or

(b) consider the UFB and RBI programmes as featuring in the HEO's world, and impute the subsidies the HEO would receive to achieve the Government's required footprint across

[149] WIK Report s 5.3.1.

[150] NWS Report s 3.1.

[151] NWS Report s 3.1 and WIK Report s 2.7.

[152] NWS Report s 3.3.

[153] Based on the Statistics New Zealand 2013 Census.

both fibre and FWA. NWS have calculated that a subsidy for the HEO of $813 million would be necessary for the HEO to extend fibre from a baseline coverage (in the absence of the subsidy) to the fibre coverage of the draft version of the model.

J10 The Commission must also take account of the favourable terms under which Chorus' Crown funding is structured: no dividends are payable until 2025 and debt repayments (face value) are due from 2025 to 2036. NWS therefore advise the Commission treat any subsidies available to the HEO as a grant.[154]

Recommendation 18	The Commission cannot ignore subsidies and yet still assume a fibre and FWA footprint equivalent to that achieved by Chorus and Vodafone. The Commission must either 1) consider the fibre and FWA roll out a profit maximising HEO would chose absent government intervention, or 2) assume the HEO operates within the same government policy setting as Chorus, and so will receive subsidies towards the cost of both fibre and FWA roll out.
Recommendation 19	The Commission must remove end-user connection fees to avoid the current error of double counting CAPEX contributions.
Recommendation 20	Given the favourable terms of Chorus' Crown funding, the Commission must consider subsidies to the HEO as a grant.

K WACC, tax and risk

K1 WACC

K1.1 We support the Commission's general approach in estimating WACC. However we recommend the Commission select a debt premium term for the regulated UCLL and UBA services equivalent to the regulatory period term, rather than two years longer. To do so would be a more appropriately mid-point approach that recognises that providers of regulated UCLL / UBA services would align debt as closely as possible with the regulatory term as they expect the WACC will be re-set at the end of the regulatory period. Setting a longer term for the debt premium than the regulatory period may lead to windfall gains, as highlighted by the Commission in relation to the Commission's input methodologies:[155]

> *In the IMs we were unwilling to set a term for the debt premium which was longer than the regulatory period when most firms were not incurring the additional cost of longer-term debt. If we had used a longer term of the debt premium, we would have compensated regulated suppliers for a cost most were not incurring.*

K1.2 NWS warn that the Commission's approach contains a significant margin of error, and warns against using observable debt by infrastructure utilities in 2010 as an appropriate proxy for a HEO

[154] REF NWS Report s 3.2.

[155] Commerce Commission (2014), *Cost of capital for the UCLL and UBA pricing reviews - draft decision*, 2 December 2014. See paragraph 89.

from 2015 onwards. The Commission should update the debt survey that was carried out in 2010.

K1.3 NWS describe difficulties in tracing the calculation of a 1.85% debt premium:[156]

> *it is not transparent how the Commission reached its final estimate of 1.85%.*

K1.4 After deconstructing the Commission's calculation as far as feasible, NWS recommend:

> *the Commission include WIAL within an average calculation (within the small sample of BBB+ bonds, namely CIAL, Genesis Energy and MRP) – but using the extrapolated figure above. This gives a debt premium of 1.83. As Genesis Energy and MRP are likely to be inflated, the inclusion of WIAL would be offset to some degree. Alternatively the median could be used which is also 1.83%.*

K1.5 Oxera's calculation of the cost of equity should be amended. For a small sample size the median is a more appropriate measure of central tendency rather than the mean. Further, Deutsche Telekom should be excluded from the sample due to the extent of its international activities.

K1.6 The Commission has considered average asset betas for the five years to 2009 and the five years to 2014, and has placed more weight on the later estimates, whilst nonetheless including the earlier estimates. The global financial crisis is likely to have affected the earlier results, and therefore we recommend the Commission use only the later estimates.

K1.7 We agree with the Commission's decision not to apply an uplift to its mid-point WACC estimate, and with much of it's reasoning on this matter. However we echo NWS's concern that as explained above, in both selection of the regulatory term and inclusion of early years in its sample for the asset beta, the Commission has adopted conservative choices, so "*choices that err on the high side rather than the low side or even the mid-point of the low-high range.*"[157]

K1.8 The Commission should ensure that it establishes both a low and high estimate for every WACC parameter (where relevant) and selects the mid-point estimate.

K2 Tax adjustments

We share NWS's concerns that the Commission's calculation of the tax-adjusted annuity factor is unclear in part.[158] We request that the Commission increase the transparency of this calculation by further clarifying its reasoning.

K3 Asymmetric risk

The Commission has included allowances for asymmetric risk. We agree that catastrophic risk would be insured against by a HEO. However we do not agree that allowances should be made for the risk of asset stranding due to technological change, as this will be anticipated by network owners, already reflected in the asset beta of the WACC. The Commission is thus allowing double-recovery of this risk, and moreover is inconsistent with its regulator peers. We agree that asset standing due to competition, re-optimisation and the risk of future regulatory decisions is not appropriate.

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[156] NWS Report s 7.1.

[157] NWS Report s7.1.

[158] NWS Report s7.2.

Recommendation 21	The Commission select a debt premium term equivalent to the regulatory period term, update the debt survey that was carried out in 2010, request that Oxera calculate the cost of equity using by the median rather than the mean, exclude Deutsche Telekom from its sample, remove the years during the global financial crisis from its asset beta calculation. The Commission should increase the transparency of the tax-adjusted annuity factor calculation. Asymmetric risk is over-stated and should be recalculated.

L Cost allocation

L1 WIK have identified concerns with the cost allocation rules used, including:[159]

(a) Over-specification (by a factor of 2) of fibres needed for DSLAM backhaul, under-specification of fibres needed for leased line and dark fibre business, and raise the concern that no fibre appears to be allocated to the FWA fibre cable. The Commission should adopt more realistic cost allocations for fibre links between the cabinet and the local exchange of 1 fibre for SLU backhaul, more fibres for leased lines (based on actual demand) and include fibres necessary for FWA connections.

(b) A share of trench costs must be allocated to copper feeder segments. The concrete cost allocation in the model is not transparent.

(c) Cost allocation for fibre links from the local exchange to the FDS should be based on a bottom up assessment of resource consumption – in this case, fibre use. WIK argue that voice uses only a minor share in bitstream service capacity and is integrated into the bitstream, and thus cannot carry an allocation of link cost.

(d) The allocation of the core network infrastructure costs is inappropriate, and WIK recommend a 1/3 allocation of costs to UBA and 2/3 to the leased line service.

(e) Non-network costs are allocated on the bases of OPEX rather than total attributable costs. The Commission and TERA both correctly describe allocation of corporate overheads, or 'non-network common costs' using an EPMU approach, so allocated in proportion to total attributable costs. This is standard practice by NRAs. However while total attributable cost includes both CAPEX and OPEX, the EPMU exercise in TERA's model allocates common costs according only to OPEX.[160] This is a serious divergence from the Commission's stated draft determination. The impact of TERA's adopted approach is substantial. Please see WIK's confidential submission at section 5.12.2 for the resulting cost inflations across UCLL and UBA. WIK also state that while the common cost mark-up for UCLL is a little higher than expected, the mark-up on UBA is 2 or 3 times that of international benchmarks. The Commission must gather further information on

[159] WIK Report s 5.12.1.

[160] TERA, Model Documentation, page 46.

non-network common costs according to international best practice, and then correct the cost allocation EPMU exercise by including CAPEX.

(f) The allocation of other maintenance costs to 'DSLAM & Active Equipment' and 'Passive Equipment' has been allocated by TERA on a pro-rata basis based on the number of active and passive cabinets for passive cabinets, and by 100% to active cabinets. WIK state this allocation decision seems arbitrary, non-transparent, and with no explanation provided.[161]

(g) The allocation rules for IT costs are implausible and not explained. WIK's view is that: "*these allocation keys are highly implausible for two reasons: Why should "other services" which generate [...] % of Chorus' revenues not bear a certain part of these costs? Furthermore, which service characteristic would justify that UBA bears four times more IT cost compared to UCLL while it represents only [...]% of the UCLL revenues?*"[162]

L2 In identifying network OPEX and non-network OPEX, TERA has made adjustments to the data provided by Chorus. Whilst backwards deduction of the allocation rules through the model is possible, TERA offers no explanation in the model documentation. Moreover, some allocation keys appear obviously incorrect, such as the inclusion of 'Telecom overhead' costs exclusively to UCLL and UBA products, whilst these should be allocated across all products.[163]

L3 The Commission should adopt more realistic cost allocations for cost allocation based on actual resource use.

Recommendation 22	Cost allocation reflect demand shares or the capacity shares of the services to which costs are being attributed.
Recommendation 23	The Commission must reconsider cost allocations for fibre shares across DSLAM backhaul, leased lines and dark fibre, the cost allocation of fibre links and the core network.
Recommendation 24	TERA must correctly implement EPMU and so allocate non-network common costs based on share of total attributable costs (CAPEX and OPEX) and not solely according to OPEX.
Recommendation 25	Rules for maintenance costs and IT costs allocations and the split between network OPEX and non-network OPEX must be made transparent.

[161] WIK Report s 5.12.3.

[162] WIK Report s 5.12.5.

[163] WIK Report s 5.13.

M TERA's model

M1 Overview

M1.1 The Commission and its consultants have delivered a draft model within an extremely short timeframe, but the speed at which it has done so has inevitably involved compromises being made in term of the analysis undertaken. Unfortunately, these compromises will – if unchallenged – result in an outcome with substantial and enduring negative effects on retailers and end users of telecommunications services. Our submissions on TERA's model are made with the intention of avoiding these outcomes.

M1.2 Our analysis shows that in addition to the Commission's series of assumptions that cumulatively operate in favour of the access seeker and skews the central estimate of the true TSLRIC, TERA's model:

(a) does not accurately reflect the Commission's draft determination;

(b) contains inconsistencies;

(c) contains inaccurate input data;

(d) contains discrepancies between the UCLL and UBA models; and

(e) demonstrates computational limitations.

M1.3 WIK have identified over 100 concerns with the model, some of which are fundamental and not simply due to choices between various viable options. WIK have prepared a detailed report on their view of the TERA model - see their submission section 5.

M1.4 The TERA model, in its current form, results in a draft TSLRIC price calculation that is at odds with the objectives of the framework set out in the Act and the Commission's stated intention to model the TSRLIC cost for a HEO deploying a network using modern equivalent assets.

M1.5 We recommend the Commission request substantial revisions be undertaken to ensure the TERA model can be relied upon to inform the Commission's UCLL and UBA TSLRIC cost calculations in line with proper objectives of TSLRIC modelling and deliver objectives that the Commission itself subscribes to. Our recommended adjustments are feasible and we look forward to working with the Commission on necessary model amendments as this process continues.

M1.6 Overall identified inconsistencies by WIK include:

(a) the model documentation is in places inconsistent with the actual model modules. One straightforward example is regarding spare capacities of copper cables. Whilst the documentation states 11% spare capacity, the relevant model parameter is set at 0%;[164]

(b) the three modules contain internal discrepancies – for example OPEX and non-network costs differ across the UCLL-OPEX model and the UCLL UBA model;

[164] WIK Report s 5.12.4.

(c) the core module computations rely on inputs from the access and OPEX modules. However there is a backwards path dependency from the core model to the OPEX model due to in-built circularity, leading to inconsistent results; and

(d) the number of lines varies for both UCLL lines and UBA (xDSL) lines varies across the OPEX and the UBA model.

M1.7 Implausible and inconsistent model results include:

(a) doubling the FDS capacity, yet keeping all else constant, results in an increase in the UBA cost. Further, a reduction in switch capacity creates a significant decrease in rack cost. This makes no sense as with lower capacity more switches and so more hosting racks would be required. WIK conclude the switch calculation in the model is not operating correctly; and

(b) doubling fibre access cable prices and fibre access joints creates a change in copper investment and costs, similarly, varying the asset lifetimes for fibre cables creates reactions in both the copper and fibre costs. This relationship shows interrelationships in the model are incorrectly specified.

M1.8 The model does not sufficiently exclude double-recovery of costs. Yet double recovery of costs is explicitly prohibited by the Act.[165] We echo WIK's concerns that:[166]

> *Generally, the Commission has relied on cost calculation methods with a high risk of double-recovery to occur although there had been alternatives which would have been more advisable for other reasons but also for the reason to minimize the risk of double-recovery.*

M1.9 The treatment of subsidies and related risk of double counting is examined in greater detail in section J above. TERA's OPEX calculations also bear a high risk of double recovery due to the inclusion of installation costs. Further, network OPEX and OPEX for transaction services do not appear to be sufficiently separated: WIK's view is that provisioning costs that should be related to transaction services feature in network OPEX. WIK also raises the potential of double counting in trenching costs via the (non-transparent) contents of the consenting and compliance cost categories.

M1.10 The model includes irrelevant costs. WIK have struggled to determine the methods of TERA in excluding irrelevant costs in the non-network cost category. Similarly, the method of excluding non-relevant OPEX is not transparent, and so WIK highlight that it is impossible to verify whether this has been correctly actioned.[167]

M1.11 TERA's model documentation is incomplete, and insufficiently transparent. Our advisors have been unable to assess the geospatial aspect of the model – because the modelling has not been made available and the model description being insufficiently transparent. Despite the importance of this modelling step - in particular with regard to the network route optimisation step which carries a substantial portion of the overall network cost - it has not been possible to engage in consultation on this aspect of the Commission's draft determination. TERA's geospatial modelling cannot be viewed and cannot be tested for consistency nor sensitivity

[165] Section 4B of Schedule 1 of the Act.

[166] WIK Report s 5.3.

[167] WIK Report s 5.10.

tested for important inputs such as demand. Section G above details our reservations on the Commission and TERA's demand assumptions, and yet we have been unable to test the magnitude of the Commission and TERA's decisions.

M1.12 It has not been possible to follow or replicate BECA's approach to calculating trench costs. WIK's section 5.5.2 presents trenching costs from a NZ source which are significantly lower than those used by BECA.

M1.13 The model suffers from technical computation problems, including:

(a) Rudimentary processes such as the requirement on users to manually transfer data from one module to another. Further, the transfers in the default model appear to be inaccurate: WIK's confidential submission at section 5.7.6 illustrates how outputs from the OPEX model do not align with the UBA model's sheet of 'inputs from the OPEX model'. These figures should be identical.

(b) The model operates at the limit of MS Access' memory capacity. This restriction is caused by the software, not the user's own computer. TERA's advice to reset the model after every sensitivity test is evidence that the model is not wholly stable. We are also concerned that optimisations that are not correct, including duct and cable optimisations, have intentionally been simplified as the software's limitations mean the necessary calculation complexity is beyond the memory capacity. We note WIK's suggestion that removing unused 'input' data and improving internal links may 'clean' the model and assist in overcoming this capacity limitation.

M1.14 Further concerns regarding TERA's modelling of the network design, technology, asset values, demand, sharing, and included throughout Part 1 of this submission.

M1.15 We do not agree that in its current form the TERA model is fit for purpose. The Commission must request substantial revisions must be undertaken and greater transparency provided. We are confident that our recommendations are workable and can be implemented by TERA.

Recommendation 26	The TERA model must be improved. Identified 'break points' must be 'mended', manual processes should be automated, and the capacity issue should be addressed. Further detailed improvements should be made as per the recommendations throughout this submission. Discrepancies between model documentation and the model must be corrected.

N WIK's sensitivity analysis of TERA model

N1.1 Vodafone, WIK and NWS all conclude that in its current form, the TERA model cannot be relied upon for the Commission's TSLRIC calculation. Concerns span the Commission's decisions, TERA's implementation of those decisions, judgements which TERA have themselves made within the model, as well as modelling inconsistencies, errors, and computational limitations.

N1.2 Given limitations in the information made available to us and limitations in the model's architecture, it has been impossible to accurately test the impact of each individual area of concern on the model's outputs, and ultimately on the final TSRIC costs calculated. For example, while we have serious concerns around the Commission's demand assumptions, and the inconsistencies in demand used in TERA's model modules, the spatial modelling component of TERA's work has not been made available to us and therefore it has not been possible to test the impact on TSLRIC prices of correcting the Commission's demand assumptions.

N1.3 This limited scope for testing the magnitude of the impact of the Commission's (and TERA's) decisions on the TSLIRC calculation leads WIK to express reservations around the expediency of attempting sensitivity testing within the TERA model. Despite these serious reservations we have requested that WIK carries out sensitivity tests where feasible.

N1.4 Partial sensitivity (or *ceteris paribus*) tests allow an assessment of standalone impact of individual parameter assumptions: so 'correcting' one factor whilst keeping all other assumptions and parameters constant.[168] Amending one input at a time also allows WIK to test that the model is operating as expected, and as explained in the Model Documentation. Given that a partial sensitivity analysis constrains endogenous relationships within the model, partial sensitivities do not provide a relevant guideline for recommended amendments to cost-based UCLL and UBA prices. Nevertheless partial sensitivities provide useful and important insights into the direction of impact WIK's recommended changes would take.

N1.5 Partial sensitivities include:[169]

(a) increasing the FWA capacity from 16.6 Mbps to 150 Mbps (as is state of the art LTE advanced technology) reduces UCLL costs by 11%;

(b) adopting more accurate sharing assumptions regarding trenching reduces UCLL costs up to 7.9% and UBA costs up to 1.6%; and

(c) adopting a technology choice between copper access and FTTH/FWA on a MDF by MDF basis rather than a nationwide uniform basis leads to a UCLL cost reduction by 4.8%.

These results are significant.

N1.6 NWS also estimate that the impact of correcting demand assumptions leads to a 9% decrease in per line costs.[170]

N1.7 However, given the endogenous impacts changing one single parameter will have on other parameters within the model, a combined sensitivity test must be carried out to accommodate such interdependencies. Therefore WIK were also requested to carry out global sensitivity analyses, within each iteration of which multiple parameters were amended simultaneously.

[168] WIK refer to this 'partial sensitivity' exercise as *ceteris paribus* sensitivity analysis.

[169] WIK Report s 6.1.2.

[170] NWS Report s 2.5.

N2 Global sensitivity analysis 1

N2.1 Table 2 below summarises the parameter changes WIK made when compared to TERA's base case calculation in the first global sensitivity analysis.

Table 2: Global Sensitivity 1: Input parameter changes compared to the base case

• MSAccess-Model:	
➢ ActivateLeadinThreshold	from 0 to 1 (connection revenues deducted)
➢ PeakCapacityThroughput FWA	from 16.666 Mbps to 150.000 Mbps
• Excel Access-Model:	
➢ Trench prices	-30%
➢ Duct prices:	-20%
➢ Investment base station:	-25%
➢ Investment frequency:	from 88 Mio. to 44 Mio.
➢ Lead in: Activate Lead in Threshold:	from False to True (exclusion of non-standard lead-ins)
• Excel Core Model:	
➢ Active Equipment prices:	-30%

Source: WIK-Consult

N2.2 The results are significant, as shown in Table 3 below. These results illustrate that a proper population of model inputs by considering available efficiency potentials and relevant cost savings would generate TSRIC price levels for UCLL and UBA which substantially below the first iteration of TERA's model.

Table 3: Effect of parameter changes on base case (WIK's Global sensitivity analysis1)

Main results	Unit	Base Case	Combination Scenario	
				change rate in %
UCLL				
National monthly rental	NZD/month	28.22	20.15	-28.6%
Urban monthly rental	NZD/month	20.63	15.15	-26.5%
Non-urban monthly rental	NZD/month	47.73	32.99	-30.9%
UBA	NZD/month	10.17	9.52	-6.4%
BUBA monthly charge	NZD/month	38.39	29.67	-22.7%
EUBA 40 monthly charge	NZD/month	40.56	31.70	-21.8%
EUBA 90 monthly charge	NZD/month	41.10	32.20	-21.7%
EUBA 180 monthly charge	NZD/month	42.06	33.10	-21.3%

Source: WIK Consult

N2.3 WIK's first global sensitivity analysis shows that by changing only those parameters outlined in Table 2 above leads to a reduction of the UCLL cost/price by more than 25%. This finding cannot be ignored.

N3 Global sensitivity analysis 2

N3.1 Table 4 below summarises the parameter changes that WIK implemented in its global sensitivity analysis 2. This second iteration included a wider set of parameter and cost changes as recommended in their submission (and summarised in our submission).

N3.2 Limitations on the ability of WIK to test sensitivities required making cost saving assumptions as follows: [171]

> *The algorithm used by TERA overestimates trench length which we assumed to increase trenching cost by 5%. We would have preferred to model all these effects specifically which was not possible because it requires major re-modelling work. We represented all these effects in a trenching cost reduction by 45%. This is in our view still conservative because it does not include the re-use of ducts and trenches. FWA site cost of 50% of the parameter value used in the model seems to be more appropriate to us. We intended to reduce OPEX by 15% and common cost by 30% in the model. This was not directly possible in the model. We had to approximate those reductions at some intermediate outputs of the model to come close to the intended reductions of OPEX and common cost. We reduced the allocation of the number of fibres in the link from cabinet to exchange by one, so that this segment of the core network only bears 33% of these link costs.*

N3.3 It is important to recognise that even this wider sensitivity testing exercise does not include the complete set of amendments WIK have recommended the Commission and TERA implement.

Table 4: Input parameter changes compared to the base case (WIK's Global sensitivity analysis 2)

• MSAccess-Model:	
➢ ActivateLeadinThreshold	from 0 to 1 (connection revenues deducted)
➢ PeakCapacityThroughput	from 16.666 Mbps to 150.000 Mbps
• Excel Access-Model:	
➢ Trench prices	-45%
➢ Duct prices:	-50%
➢ Manhole prices:	-20%
➢ Fibre cable prices	-20%
➢ Investment base station:	-50%
➢ Investment frequency:	from 88 Mio. to 0 Mio.
➢ Lead in: Activate Lead in Threshold:	from False to True (exclusion of non-standard lead-ins)
• Excel Core Model:	
➢ Active Equipment prices:	-30%
➢ Share of civil engineering allocated to xDSL (Cabinet to Exchange):	from 66% to 33% (2/3 to 1/3)
➢ Opex and common cost	
○ OPEX and non-network cost UCLL	-24.25%
○ OPEX and non-network cost UBA:	-26.55%
○ FWA yearly OPEX:	-15%
○ Paycosts (To add to UCLL OPEX) Access Network:	-15%

Source: WIK-Consult

[171] WIK Report s6.1.3.

N3.4 The results of the extended global sensitivity analysis are again striking, as shown in Table 5.

Table 5: Effect of parameter changes on base case (Global sensitivity analysis 2)

Main results	Unit	Base Case	Combination Scenario	
				change rate in %
UCLL				
National monthly rental	NZD/month	28.22	16.64	-41.0%
Urban monthly rental	NZD/month	20.63	12.93	-37.3%
Non-urban monthly rental	NZD/month	47.73	26.17	-45.2%
UBA	NZD/month	10.17	7.83	-23.0%
BUBA monthly charge	NZD/month	38.39	24.47	-36.3%
EUBA 40 monthly charge	NZD/month	40.56	26.14	-25.6%
EUBA 90 monthly charge	NZD/month	41.10	26.55	-35.4%
EUBA 180 monthly charge	NZD/month	42.06	27.29	-35.1%

Source: WIK calculations

N3.5 Significant changes to the TSRIC calculation result. The monthly rental for UCLL decreases by 41% to $16.64 and the effect of our parameter changes on UBA costs is a decrease by 23% to $7.83 per month. These changes have been realised without any amendments to the demand assumptions, which both NWS and WIK state would have an important additional impact.

N3.6 WIK have highlighted that correcting only the more substantial drawbacks of the modelling would result in significant amendments to the TSLRIC price, a complete treatment addressing the full set of WIK's concerns could be expected to lead to TSLRIC reductions of up to 50% below the currently calculated level:[172]

> *In the global sensitivity presented* [...] *we corrected for some of the most important deficiencies of the model. Many others could not be corrected for because this would require major re-modelling work which we could not conduct. Making these necessary corrections and parameter changes would lead to a UCLL cost which is 41% below the level calculated by TERA. If all of the deficiencies identified by us would be corrected for we would expect the UCLL TSLRIC cost to be in a range of $ 14 and $ 16 in New Zealand, which means 43% to 50% below the level calculated by TERA.*
>
> *Most of the necessary corrections regarding UBA have been included in the global sensitivity II. This leads to a reduction of the calculated UBA cost by 23%. If all necessary corrections and parameter changes would be included in the model we would expect the UBA TSLRIC cost to be in a range between $ 7 and $ 8 in New Zealand. On this basis the relevant TSLRIC for UBA would be between 21% and 31% below the level calculated by TERA.*

N3.7 We find it important that WIK's results fall below the prices arrived at via the Commission's 2012 IPP benchmarking exercise (as shown in Table 6 below), and thus would indicate that contrary to submissions by other parties, New Zealand is in fact not so different to other countries that have undertaken network cost modelling similar to the TSLIRIC approach.

[172] WIK Report s6.1.3.

Table 6: Monthly UCLL rental benchmark under the Commission's IPP benchmarking, 2012

Mean	$ 17.51
Median	$ 17.60
25th percentile	$ 15.95
75th percentile	$ 18.90

Source: Commerce Commission

N3.8 WIK has also highlighted this implication:[173]

> *It is not surprising to us that the relevant range of the UCLL TSLRIC cost on the basis of proper modelling* [...]*are close to the monthly rental benchmark which the Commission has developed under the raw benchmark approach in 2012,*[174][...]. *I*

and explains a key driver of this result as being due to the treatment of trench costs:

> *In its 2012 benchmark-based decision the Commission rejected the raw benchmark approach because it did not adequately apply the comparable countries requirement and would have resulted in downwards bias of results. The main driver of UCLL costs is the trench length per connection. Given the geography of New Zealand and the distribution of population (and fixed line users) there are indications of a longer average trench length in New Zealand compared to most of the countries included in the Commission's benchmark at that time. In its modelling approach the Commission made the most important assumption of excluding the capital cost of connections outside the TSO area for the UCLL cost calculation, which we support as a pragmatic approximation. Excluding the 6.4% connections of the non-TSO areas also meant to exclude those loops with an over-proportional loop length. Altogether 47.5% of the total road network length is attributed to these 6.4% connections.*[175] *Excluding these most lengthy loops mostly adjusts for the important geographical and cost differences to the benchmark countries. In a model sensitivity TERA has calculated the impact of including the area outside the TSO-derived boundary. Including the capital cost of these 6.4% connections would increase the calculated UCLL cost from $ 28.22 to $ 35.21,*[176] *which means by 24.8%.*

N3.9 We believe that WIK's sensitivity analysis is further evidence that the Commission has made a series of assumptions and decisions tilted in Chorus's favour, therefore its draft determination, and TERA's cost modelling, does not represent an orthodox TSLRIC approach. Amendments as detailed in this submission can and must be made to TERA's model.

[173] WIK Report s6.2.

[174] See Commerce Commission, Final determination on the benchmarking review for the unbundled copper local loop service, 3 December 2012.

[175] Draft UCLL Determination at [322], footnote 268 and [813].

[176] TERA, Model Specification, p. 78.

Part 2: The Chorus cost network model

O Feedback on the Chorus models

O1 Introduction

O1.1 Chorus has commissioned Analysys Mason to develop UCLL and UBA network cost models. In this section we refer to these models collectively as the 'Chorus network cost models'.

O1.2 NWS and WIK have conducted a high level review of these models with particular reference to whether they are consistent with the principles for TSLRIC modelling set out in the Draft Determinations and adopted by TERA.[177]

O2 Fundamental flaw: Chorus' network modelled, not an HEO MEA

O2.1 NWS raise a fundamental concern:[178]

> *While some differences relate simply to alternative values of inputs and assumptions to those used by the Commission, others are more serious in nature as they are* ***contrary to the fundamental principles of TSLRIC modelling and*** *as such fail to comply with the requirements of the FPP process.* (Emphasis added)

O2.2 The Chorus network cost models have been built to reflect Chorus' actual network. The models do not reflect an economically efficient operator utilising modern equivalent assets (MEA). As such, the models do not adhere to the Commission's TSLRIC modelling criteria and principles. Our view is echoed by WIK:[179]

> *The basic starting point of Analysys Mason's top-down modelling approach are the assets which make up the Chorus network today and which are derived from Chorus' asset data base. The actual network is reflected in the type and volume of assets and network elements, the technology used and in the architecture of the network deployed.*
>
> *A network which represents the historic path of its deployment and growth over several decades looks different compared to a newly deployed network. New construction areas have been developed, new network node functions have been allocated and new technical characteristics require a new efficient network topology design. Another typical example of path dependent inefficiency follows from parallel trenching. If a network growths fast over time often the existing duct – if existing at all - and trench capacity is not sufficient to host additional cables which are needed to meet that demand. In this case parallel trenches have to be deployed. This makes sense from an incremental development path of the network but it does not lead to efficient cost like a network deployment which dimensions the network on the basis of current demand. This phenomenon is similar to asset re-use. If assets can be re-used even an inefficient network architecture can lead to lower actual costs than an optimized replacement costing approach.*
>
> [...] *the model is not estimating the cost of an efficiently engineered copper network and will not derive efficient costs. Instead, it is basically valuing an inefficient network...*

[177] TERA, Model Reference Paper, Appendix.

[178] NWS Report s 8.

[179] WIK Report at Executive Summary [27-28] and s7.2.2.

Chorus' models are not built such that they meet major criteria and principles which the Commission has set for TSLRIC costing.

Our analysis led us to the conclusion that Chorus' models are not suitable to inform the Commission's TSLRIC-based UBA and UCLL pricing FPP determinations.

O2.3 Furthermore, Chorus network cost models assume both a copper access network and a hybrid copper/fibre access network reflecting Chorus' transition from a copper to a fibre network, which fundamentally diverges from the Commission's MEA concept:

[Analysys Mason] seems to model not only a copper access network but a hybrid copper/fibre access network reflecting Chorus actual network environment where Chorus actually builds a fibre network in its UFB areas on top of its existing copper network. Effectively, [Analysys Mason] models Chorus transition from a copper to a fibre network. This is not the conceptual starting point of the Commission's HEO. [180]

O2.4 WIK notes the following features of the Analysys Mason's approach:

What [Analysys Mason] actually does is to burden major parts of Chorus fibre deployment costs to the users of the legacy copper network services. This allocation approach is not coherent with TSLRIC costing principles.

O2.5 The Chorus network cost models are based on the historic, inefficient network design of Chorus' actual network which has been built up over many years of incremental network decisions and investments. The UCLL model is based on actual asset counts "*as Chorus' actual investment decisions are taken as a proxy for an efficient operator*" and the UBA model '*combines a bottom-up model for electronics with actual asset counts for civil works* [...] *and actual number of nodes...".*[181] Historic decisions cover:

a) *Technology choice:* The Commission has specified the MEA is P2P fibre and FWA, whereas the Chorus network models feature only limited fibre in the feeder network models and no fibre in the distribution network. No FWA technology is considered.

b) *Network optimisation:* The Commission has specified a modified scorched node approach however the Chorus network models attempt no node optimisation and simply reflect the existing network. Similarly, no optimisation is undertaken for path, duct or cable lengths, nor for network costs (where for example trench costs optimisation differs from trench length optimisation).

A useful summary of the Commission's TSLRIC criteria that the Chorus network cost models fails to meet is provided by NWS, replicated as

[180] WIK Report s7.1.1.

[181] Analysys Mason, 2014, Model User Guide UCLL, p4 and Model User Guide UBA p1.

Table 7

O2.6 Table 7: Modelling criteria that are not satisfied by the Chorus modelbelow.

Table 7: Modelling criteria that are not satisfied by the Chorus model

	Criterion
7	The MEA of the UCLL is the cost-efficient way of providing the UCLL service.
8	The MEA of the UCLL is based on a mix between a point-to-point fibre network and an FWA network.
9	The cost of the MEA should be adjusted to reflect the cost difference between the MEA network and the copper network.
10	In order to compute the cost-adjustment, a copper access network and a fibre + FWA network should be modelled. The adjusted cost of the MEA network is the cheapest network selected at the national level between the two scenarios identified.
12	The fibre network should be a PTP network.
13	The FWA sites should be the RBI sites.
14	The FWA sites should be connected to the nearest exchange. Customers located on the way from the FWA sites to the exchanges should be connected by the FTTH network.
15	The FWA should use the LTE technology.
16	The FWA coverage should be Vodafone's RBI coverage.
22	The UCLL demand should be constant.
23	The modified scorched node approach should be modelled (for UCLL).
25	The length-based optimisation approach should be followed for the modelling of the copper network.
26	The length-based optimisation approach should be followed for the modelling of the fibre network.
39	The UBA demand should be constant.
48	The modified scorched node approach should be modelled (for UBA).
58	Operating costs should be calculated using opex from the accounts with efficiency adjustments, real bottom-up assessment should be performed for energy and square meters costs.
59	A tax adjusted annuity should be used to derive the annual costs.

Source: NWS

03 Flaws in modelling analysis

03.1 Beyond the fundamental flaw identified above, Vodafone and our consultants observe the following key flaws in the Analysys Mason model:

(a) efficiency adjustments are effectively ignored;

(b) input parameters are inflated;

(c) OPEX and common costs are not optimised;

(d) demand assumptions are inconsistent across Chorus models;

(e) FWA is ignored;

(f) WACC is inflated and tax adjustments are ignored;

(g) CAPEX doubles during the modelling, without explanation;

(h) the models are not transparent.

O3.2 Each of these concerns are detailed below, but in summary these deficiencies severely undermine the credibility of the Analysys Mason model for predicting TSLRIC costs for the regulated services, in a manner consistent with the Commission's obligations under the Act.

Efficiency adjustments are effectively ignored

O3.3 The Chorus network cost models do implement an efficiency adjustment factor for asset counts, which WIK argue are arbitrary and far too low:

> *These adjustment factors differ according to asset groups, deployment forms (aerial, sharing) and also depend on assumptions concerning the degree of optimization (current or highly optimized). The size of the adjustment varies from 5% to 20%. The amount of the adjustment occurs in 5% steps[182], by this representing an arbitrary setting and its reasoning remains completely intransparent. It is neither argued for nor is it benchmarked towards target values. From our point of view all adjustment values are significantly too low.*

O3.4 Instead, WIK recommend the adjustments shown in Table 8 below.

Table 8: Efficiency adjustment factors

	Adjustment used by Analysys	Minimum adjustment expected
Optimization	10%	50%
Sharing	5%	50%
Aerial	20%	50%

Source: WIK Consult

O3.5 WIK also highlight the lack of consideration of the potential for asset sharing: in Chorus' models, this potential has effectively been ignored.

Input parameters are inflated

O3.6 WIK highlight significant cost inflation due to overpriced input parameters:[183]

> *We did not assess and benchmark all input parameters of the Chorus model. Instead, we focussed on a few selected items which have some relevant impact on the level of unit costs. The few examples which we picked indicate a significant cost inflation due to the use of overpriced input parameters.*

O3.7 WIK's concerns around input prices include:

(a) list prices of vendors are relevant to incremental network extensions and not the deployment of a new MEA network. WIK state that vendor list prices over-estimates equipment and other input prices by 20% to 40%.

(b) chassis costs for DSLAM and FDS are inflated by up to 5.7%:[184]

> *Beside the unit direct CAPEX the chassis for DSLAM and FDS are valued in addition by indirect CAPEX of significant size, taking values between approximately 0.6 and 5.7 fold the direct CAPEX value. The indirect CAPEX increase neither depends on the size of*

[182] See Analysys Mason's Presentation on Chorus network modelling, 2 December 2014, p. 6.

[183] WIK Report s7.2.6.

[184] WIK Report s 7.2.6.

direct CAPEX nor on chassis size and it is the same for both FDS chassis sizes despite the fact that they differ in price [see WIK Table 7.2]*. The port cards of all active systems are not burdened with indirect CAPEX in the Chorus model. Thus neither a rule nor any other description explains such significant cost increase. The indirect investment in its amount are intransparent and are unjustified in its size.*

(c) national average trench prices are significantly above those of the TERA model, which are too high already. For detail of the trenching price comparison please see WIK's Confidential Submission Tables 7.3 and 7.4.

(d) double counting appears to be occurring:[185]

The intransparency of the model does not allow to check whether the Chorus' model has excluded the double-recovery of costs. Nevertheless, there are indications that at least the danger of double-recovery is highly relevant.

Opex and common costs are not optimised

03.8 A HEO would optimise its operating costs. However the Chorus network cost information is historical information obtained primarily from Chorus' own General Ledger with no efficiency adjustments applied, or is information obtained from unidentified sources with no mention of efficiency adjustments.[186] It is not appropriate to apply Chorus' historical operating costs to an HEO.

03.9 WIK raise concerns regarding the internal consistency of the OPEX calculation:

The determination of OPEX faces the same starting point as the determination of OPEX conducted by TERA in its modelling approach: It basically relies on Chorus actual OPEX without checking the efficiency of the incurred costs. The approach is not even [internally consistent]. *The OPEX as used in the model do not reflect the fact that the structure and volumes of assets are different to Chorus' actual numbers because of the efficiency adjustments which Analysys conducted.*

03.10 And while WIK have criticised the adjustments made by TERA for OPEX, the direction of those adjustments is considered necessary:[187]

Although we have criticized the approach which TERA has applied to make these two adjustments, we nevertheless regard the direction and the extent of these adjustments as necessary. Analysys has not made such adjustments at all. The OPEX used in the model therefore are related to an asset base which is actually not used in the model, represents the maintenance requirements of an "old" network and ignores the maintenance savings of a modern fibre network. As a result the OPEX used in the model are significantly inflated compared to those which an HEO would face which is operating the relevant MEA network.

03.11 Moreover, WIK identify double counting in Analysys Mason's OPEX calculation:[188]

We do not see any reflection in the model user guide provided by Analysys Mason of whether the OPEX which are related to transaction services and not to operating the network are deducted from the relevant cost base. Therefore, there is reason to assume that a lot of irrelevant cost which are not

[185] WIK Report s 7.2.7.

[186] Analysys Mason, 2014, Model User Guide UCLL, p9 and Model User Guide UBA p8.

[187] WIK Report s 7.1.3.

[188] WIK Report s 7.1.3.

caused by the operation of the UBA and UCLL services are included in the OPEX cost base. This would imply a double-recovery of costs.

O3.12 Similarly, NWS identify double counting in the treatment of RBI.[189] Whilst RBI is mentioned as an included service in the UCLL documentation, there is no mention of RBI in the UBA model. Double counting appears to be taking place: costs are calculated for RBI services and the model also includes cost levies that fund the RBI, meaning government subsidies have not been recognised.

O3.13 WIK also highlight that Chorus' common cost mark up for UCLL appears reasonable, the mark up for UBA is excessive:

The significant differences between both mark-ups are not in line with the EPMU allocation of common cost as proposed by the Commission[190] and also supported by Chorus[191].

Demand assumptions are inconsistent across Chorus' models

O3.14 The Commission assumes constant demand over the regulatory period. Whilst this assumption is replicated in Chorus' models - service demand remains constant - the Chorus UCLL model asset count is not driven by service demand and so demonstrates increasing asset numbers, in asset classes including:[192]

(a) feeder manholes, to active cabinets, fibre (asset IDs 137–144);

(b) feeder cable route, trench, to active cabinets, fibre (asset IDs 177, 181); and

(c) feeder fibre cables (asset IDs 353–362).

O3.15 Further, the number of assets in these asset classes more than quadruples over the regulatory period. We do not agree that asset deployment can be decoupled from service level demand, and do not agree that the projected asset number increases can be justified for an HEO deploying MEA.

O3.16 The Chorus UBA model does link service level demand with asset counts, and allows for assets counts to chance as service levels' demand changes. Demand level assumptions and the relationship between demand and asset counts are both inconsistent across the UCLL and UBA models.

O3.17 WIK highlight the internal inconsistency in the Chorus models' demand assumptions:

The Chorus' model assumes a constant demand for UCLL over the (intended) regulatory period [... and so] *Chorus' model neglects the cost decreasing effect of a growing demand.*

In contrast to the UCLL model the UBA model assumes a declining demand. This represents a major conceptual difference to the Commission's model which makes the models incomparable and leads to increased costs.

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[189] NWS Report s 3.1.

[190] Draft UCLL Determination [327.2] and Draft UBA Determination [292.2].

[191] See Chorus, Submission in response to the Commerce Commission's Consultation paper outlining its proposed view on the regulatory framework and modelling approach for UBA and UCLL services (9 July 2014), pages 7, 15 and 27.

[192] See TERA's UCLL model: "FullNw" worksheet.

FWA is ignored

03.18 The Chorus models ignore the cost saving potential of FWA. This omission simply cannot be consistent with the concept of an HEO MEA. This point is fully discussed in section E and is, we feel, so obvious as to not warrant further discussion within our submission on Chorus' modelling.

WACC is inflated and tax adjustments are ignored

03.19 WACC is inflated, at 8.1% while the Commission has chosen 6.47%. The return on capital is further inflated as no adjustments for tax is allowed for in the Chorus model's titled annuity calculation.

CAPEX doubles during the modelling, without explanation

03.20 WIK highlight concern over the unexplained inflation of CAPEX:

> *CAPEX has nearly doubled during the transformation, which has neither been explained in the model documentation nor in the model. This means, it remains intransparent and unjustified. The level of the resulting monthly unit cost consequently are already inflated by a factor of two just for this reason.*

The models are not transparent

03.21 NWS have confirmed that it has been unable to verify whether aspects of the Chorus model are or are consistent or not consistent with further Commission TSLRIC criteria and principles.

03.22 It is not clear whether or not the models are consistent with several of the modelling criteria (Exhibit 8.2).

Table 9: Modelling criteria for which it cannot be verified whether satisfied by the Chorus model

Criterion	
6	The red zones in the Christchurch area should be disregarded.
17	The capital cost of the access network should be computed within the Commission's TSO-derived boundary. However, the cost of connections outside the boundary for the part of those connections that is within the boundary should also be included. It is assumed that the capital contributions cover exactly the cost outside the boundary. The operating costs of the access network should however be computed over a nationwide network.
33	The cost of the DSLAM included in the RBI program should not be recovered by Chorus through UBA.
61	The price control period is the 2015-2019 period.

Source: NWS

04 Conclusion

04.1 There has been little attempt by Analysys Mason to consider the network an HEO using MEA would deploy today.

O4.2 NWS' conclusion, that the Chorus models are not suitable for the TSLRIC modelling that the Commission is required to perform, is important:[193]

> *We found that the Chorus models are not suitable for the TSLRIC modelling that the Commission is required to perform for its FPP pricing review. In particular, it was apparent in a number of key aspects* ***the Chorus' models are contrary to the fundamental principles of TSLRIC modelling and therefore fail to comply with the requirements of the FPP process****.* (Emphasis added).

O4.3 WIK state that Chorus' results are implausible:

> *The Analysys Mason model generates a unit cost for UCLL of $ 74.10 and of $ 84.87 for UCLFS. These numbers would signal that the access costs in New Zealand would be higher by a factor of five (or even more) compared to the benchmark which the Commission used in its 2012 IPP benchmark decision of 2012. Given the degree of urbanisation and population density in New Zealand compared to the benchmark countries there is no relevant cost driver which could generate such discrepancies of access costs calculated on a TSLRIC basis.* ***The results are simply ridiculous and indicate major conceptual flaws and the use of cost inflating input parameters. We cannot believe that the professional experts of Analysys Mason would believe their own results to characterise prudently and efficiently the relevant TSLRIC cost in New Zealand.*** (Emphasis added).

and furthermore:

> *The results represent some overall inconsistencies which also support our general conclusion and assessment that the Chorus model is not suitable to inform the Commission's UBA and UCLL price determination. As an example, the UCLL model produces an SLU price that is slightly higher than the UCLL price although UCLL includes more network elements. This is implausible. It is also implausible that the costs for UCLFS are about 15% higher than the cost of UCLL although this service uses less network elements than UCLL and supports just low bandwidth services.*

O4.4 So WIK also conclude the Chorus model is not suitable to inform the Commission's UBA and UCLL price determination.

O4.5 We agree that the Chorus models do not represent an HEO deploying a MEA network, and thus do not represent a TSLRIC calculation. The Chorus models must be disregarded by the Commission.

Recommendation 27	The Chorus models do not represent an HEO deploying a MEA network, and so are not consistent with the Commission's criteria and principles for a TSLRIC calculation. The Chorus models must be disregarded by the Commission.

[193] NWS Report s 8.3.

Part 3: Preliminary view on backdating

P Emerging thinking

P1.1 Vodafone has previously accepted that:

(a) the Commission is not required to backdate any pricing decision, but has the discretion to do so;

(b) any decision to backdate should be consistent with s 18 and will need to be demonstrably efficient;

(c) the Commission's discretion includes flexibility to smooth any backdated sum;

(d) the Commission cannot reach a firmer view on backdating until the implication of any price change that might result from the FPP process is known.[194]

P1.2 Although the UCLL and UBA Draft Determinations expressed no view on backdating, the Commission has now set out its preliminary thinking on whether the final FPP prices for the UCLL and UBA services should be backdated to apply from 1 December 2014 (the date that IPP prices for UCLL and UBA came into effect).[195]

P1.3 The Commission considers that it has a backdating discretion, the exercise of which has three dimensions:

(a) whether to backdate (the Commission's provisional view is that it should);

(b) when to backdate to (provisionally, the Commission considers that backdating to 1 December 2014 is appropriate); and

(c) how to backdate (the Commission has not expressed any views yet on practicalities).

P1.4 The Commission has said that a final decision on backdating must take into account the following considerations:

(a) s 18 of the Act, which provides "*the most important guidance*";

(b) whether backdating is "*demonstrably efficient*";

(c) whether backdating will "*demonstrably promote competition in a way that is likely to directly benefit end users*".[196]

P1.5 The Consultation Paper provides extremely limited information as to the Commission's reasoning in support of its emerging view that backdating should occur. The Commission advises that it intends to correct this by providing further reasons in a further Draft Determination to be issued in May 2015. We look forward to seeing this further explanation of the Commission's thinking.

[194] Vodafone submission (6 August 2014) at [E4.1].

[195] Commerce Commission consultation paper (19 December 2014) at [12] to [33].

[196] Commerce Commission consultation paper (19 December 2014) at [15].

P1.6 As it stands, the reasoning set out in the Consultation Paper does not provide a sufficient basis for a decision to be made in favour of backdating. By way of illustration, the Commission explains that

> *"A key reason in favour of backdating a final FPP price is that the FPP price can be seen as a correction of the 'proxy' IPP price, the FPP price being a more accurate implementation of forward-looking cost-based pricing" (emphasis added).*[197]
>
> *"...we consider that section 18 would be better served by having the most accurate price (ie, the FPP price and not the IPP price) take effect from the first day after the 'retail-minus' price freeze ends. Our preliminary view is to backdate the final FPP monthly price for the UBA service to 1 December 2014" (emphasis added).*[198]

P1.7 This logic is flawed:

(a) Both IPP and FPP processes have the objective of setting prices that reflect the forward looking cost based pricing method. They differ in terms of the methodology by which this is done: benchmarking for IPP, TSLRIC for FPP.

(b) FPP prices do not in any sense 'correct' IPP prices. IPP prices have effect unless replaced by FPP prices. But replacement does not imply any correction.

(c) Where replacement occurs, IPP prices still remain valid as the Commission implicitly accepts.[199] Any replacement of IPP prices by FPP prices simply reflects a statutory scheme that provides for a second mechanism for pricing to apply on application.

(d) The fact that IPP prices remain valid and can in principle be restored, as contemplated by the statute, even where replaced by FPP prices of itself defeats the argument that they are discarded as 'incorrect'.

P1.8 The Commission's reasoning that FPP prices 'correct' IPP prices sits awkwardly with the scheme of the Act. The Commission recognises that IPP prices may (if not challenged) provide the final prices that access seekers must pay to Chorus for access to its UCLL and UBA services. It also notes, the prices for Chorus's UCLL and UBA services could also revert to IPP prices after the expiry date for FPP prices specified by the Commission unless it updates the FPP price it sets (pursuant to ss 30R and 30P of the 2001 Act) before this date. Moreover, and as the Court of Appeal recognised in its *Telecom v Commerce Commission and TelstraClear* judgment,[200] an FPP price does not supplant an IPP price because the latter is wrong.

P1.9 Putting aside the flaws in the reasoning in favour of backdating set out in the Consultation Document, substantive reasons against backdating of FPP prices include the following

[197] Commerce Commission consultation paper (19 December 2014) at [16].

[198] Commerce Commission consultation paper (19 December 2014) at [23].

[199] Draft UCLL Determination at [229]; Draft UBA Determination at [200].

[200] CA75/05, 25 May 2006 at [15].

(a) **Backdating is purely a wealth transfer**. In terms of its impact on competition for the long term benefit to end users, which the Commission accepts that the most important consideration in any analysis, backdating simply involves a transfer to one side of the market. The Commission's preliminary thinking proposes a transfer from access seekers (facing substantial competition in retail markets) to Chorus (facing no competition in wholesale markets – and certainly no competition in respect of supply of the services in respect of which backdating occurs). Absent backdating in favour of Chorus, it would be expected that competition would result in any benefit conferred on access seekers being competed away either in the form of lower prices (consistent with retail price trends in retail telecommunications markets over the past several years), investment in new products or services, or additional infrastructure to support provision of services. Conversely, Chorus faces no competitive pressure – and no other form of incentive – to ensure that the benefit conferred in its favour is passed on to end users. Deployment of a UFB network cannot be counted as a benefit derived from backdating (since Chorus is already bound by existing contracts by the Crown to deliver this).

(b) **Inequity to access seekers, and therefore consumers**. As the Commission has recognised,[201] it is extremely difficult for access seekers to set prices when their input prices are subject to backdated changes which are uncertain as to quantum and timing. Contracts with end users, coupled with strong competition in retail markets, prevent access seeker from passing FPP price adjustments from being passed on retrospectively (or prospectively, for the term of any fixed contact with end users). Requiring access seekers to incur the losses from any backdating of a lower FPP price will operate as a significant deterrent to their investment in new products or services, or emerging technologies, of direct benefit to end users. In the extreme, some access seekers may be compelled to cease providing some products or services, or more drastically to exit certain retail markets altogether. None of these outcomes is consistent with the purpose statement in s 18(1) of the Act.

P1.10 Vodafone intends to submit on these points in further detail after the Commission has provided a fuller explanation of its reasoning in support of backdating – and the initial comments above in no way capture the extent of our likely submissions on this point.

P1.11 Our recommendations as to how the Commission should approach backdating will also be provided when the Commission has provided a fuller explanation of its approach to backdating. Although we are entirely opposed to backdating in this instance, our initial submission on this point is that the Commission should include the backdating component in the FPP monthly charge and recover the backdated sum incrementally on a forward looking basis. This approach would be consistent with the obligations to which the Commission is subject when it exercises its claw-back powers under the Commerce Act 1986 is required to "*spread over time*" any over- or under-recovery of revenue "*to minimise undue financial hardship to the supplier*" or "*to minimise price shocks to consumers*" (as the case may be).[202] The same policy considerations apply here, and can be said likewise to justify the spreading over time of backdating payments.

P1.12

[201] Commerce Commission consultation paper (19 December 2014) at [16].

[202] See s 52D of the Commerce Act 1986.