Final report for Spark New Zealand and Vodafone New Zealand

Analytical frameworks for an uplift to the TSLRIC price and WACC

UCLL and UBA final pricing principle

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NETWORK STRATEGIES
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0 Executive summary

We have serious reservations regarding the Commerce Commissions proposed analytical frameworks for evaluating the welfare effects as the result of an uplift in the TSLRIC price and the WACC for the unbundled copper local loop (UCLL) and unbundled bitstream access (UBA) services.

We do not support the application of an uplift to either the TSLRIC price or the WACC. In our view the role of regulatory pricing is to set economically efficient pricing – which is delivered via the TSLRIC approach – in markets without effective competition. If policy makers seek a mechanism to achieve social policy goals this should be explored via alternative means, not via regulated prices.

We do not believe that the Commission has demonstrated that welfare would be increased if uplifts are applied. The estimated welfare loss due to the increase in copper prices is likely to far outweigh any welfare gain from faster fibre migration or the development of new services, even if the Commission's frameworks were enhanced to address their shortcomings.

Uplift in TSLRIC price

In regard to the Commission's framework for evaluating the welfare effects of an uplift in the TSLRIC price, the key problems include:

- a number of impacts are not considered by the framework
- lack of inputs appropriate for the New Zealand environment over the forecast period (due to lack of reliable and relevant data)

- some errors in the calculations.

While we have made a number of recommendations to strengthen the Commission's analysis, our expectation is that exactly the same conclusion will be reached if the Commission's framework was enhanced to be a full and accurate representation of welfare effects in the New Zealand market.

Uplift to the WACC

With regard to a framework for exploring the effect of an uplift to the WACC, while we do not believe any such uplift is required, we find that the Oxera approach proposed by the Commission is preferable to the Frontier-Dobbs model as implemented by CEG. Nonetheless the Oxera approach does have considerable limitations which will compromise its ability to aid in the Commission's decision process and may indeed introduce regulatory error.

Monte Carlo simulation

The Commission is also considering a Monte Carlo simulation for investigating the uncertainties within the WACC. It would be necessary to ensure that the analysis encompasses variation within and the relationships between the WACC parameters – this requires assumptions regarding the variability of more parameters than were modelled within CEG's Monte Carlo analysis. Furthermore the various statistical measures and distributions of all the WACC parameters should be based on up-to-date data that is appropriate for telecommunications businesses.

However we anticipate that the resultant simulation would produce a WACC distribution with a relatively large standard error, which would not provide any reassurance of a reduction in regulatory risk.

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1 Introduction

In conjunction with the April 2015 conference on unbundled copper loop (UCLL) and unbundled bitstream access (UBA), the Commission released a paper[1] outlining some analytical frameworks for exploring potential uplifts in the TSLRIC price and WACC.

Following this introduction, this report includes:

- our constructive critique of the Commission's framework for an uplift to the TSLRIC price (Section 2)
- comments on the Commission's framework examining the case for an uplift to the WACC (Section 3)
- our opinion as to the value of exploring the uncertainties associated with the WACC via a Monte Carlo simulation (Section 4)
- concluding remarks (Section 5).

Although this report has been commissioned by Spark New Zealand (Spark) and Vodafone New Zealand (Vodafone), the views expressed here are entirely our own.

[1] Commerce Commission (2015), *Agenda and topics for the conference on the UCLL and UBA pricing reviews*, 2 April 2015.

2 Uplift on TSLRIC price

The Commission has developed an analytical framework for exploring whether there should be an adjustment to the UCLL and UBA price, either through an uplift to the WACC (described in Section 3) or an uplift to the TSLRIC price derived from the Commission's model.

The Commission's hypothesis is that the latter may be justified by the economic benefits of migration to fibre: if an increase in the copper price stimulates migration, the benefits may be greater than if the UCLL price was set to the economically efficient TSLRIC price.

To that end, the Commission has devised an analytical framework for estimating the effect on consumer welfare of an uplift in the TSLRIC price. Spark and Vodafone have asked us to review the parameters tested in this framework.

It should be noted that we do not support the application of an uplift to either the TSLRIC price or the WACC. The role of regulatory pricing is to set economically efficient pricing – which is delivered via the TSLRIC approach – in markets without effective competition. The question of uplifts to achieve policy goals is the role of the policy maker, not the regulator, and should be considered as a separate issue to that of regulatory price setting.

2.1 Cross-price elasticities

In order to estimate an uplift in UFB demand due to higher copper prices, the Commission has assumed a cross-price elasticity of 1.2. This can be interpreted as a 1% increase in retail copper price will increase fibre demand by 1.2%.

We agree with the Commission that the cross-price elasticity is a key assumption in its analysis, however we also agree with Professor Vogelsang[2] that the value of 1.2 appears to be high.

There is very limited information available on cross-price elasticities for fibre demand with respect to copper, however the Commission was able to source five studies, with estimates ranging from 0.6 to 3.3. The value of 1.2 – which is the second highest across the studies – comes from an analysis of 30 OECD countries (the Shinohara study[3]). The Commission may have selected this value as it is below the midpoint of the range, but in our view the value of 3.3 should be omitted from consideration.

This higher elasticity comes from a 2011 study of the Swedish broadband market[4] using data from 2009. Note that one of the authors of this study produced a conference paper a year later (also referenced by the Commission[5]), which appears to use the same 2009 data, but with much lower cross-price elasticities. This suggests that the original study may have been revised or improved. It is not clear in this paper the value of the cross-price elasticity for fibre demand with respect to copper, however an upper ceiling would be:

- 0.845 in areas with copper, fibre and mobile broadband
- 0.945 in areas with copper, fibre, cable and mobile broadband.

Once the 2011 Swedish study is omitted from consideration, the Shinohara estimate is the highest. Professor Vogelsang is rightly cautious regarding this estimate, and states that a quantitative estimate for New Zealand cannot be derived from this study. We note that:

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2 Professor I. Vogelsang (2013), *What effect would different price point choices have on achieving the objectives mentioned in s 18, the promotion of competition for the long-term benefit of end-users, the efficiencies in the sector, and incentives to innovate that exist for, and the risks faced by investors in new telecommunications services that involve significant capital investment and that offer capabilities not available from established services?*, 5 July 2013, paragraph 45.

3 Shinohara, S., Akematsu, Y. and Tsuji, M. (2011), Analysis of broadband services diffusion in OECD 30 countries: Focusing on open access obligations, 8th International Telecommunications Society (ITS) Asia-Pacific Regional Conference, Taiwan, 26-28 June, 2011: Convergence in the Digital Age.

4 Srinuan P., Srinuan C. and Bohlin, E. (2011), *The Mobile and Fixed Broadband Battle in Swedish Market: Complementary or Substitution?*, Robert Schuman Centre for Advanced Studies.

5 Bohlin, E. (2012), *The mobile and fixed broadband battle in Sweden*, International Conference: Mobile broadband – Competitive dynamics and policy implications, 11-12 September, 2012.

- data was for the period from 2000 – it is unclear as to the most recent data, but unlikely to be later than 2010
- not all the OECD countries had fibre broadband, and only eight countries had more than 10% take-up by 2010, thus effectively representing mainly early adopters in those markets
- DSL take-up was in its infancy in 2000, and many countries may not have achieved a mature or saturated broadband market by the end of the study period
- fibre prices would have been relatively high in comparison to DSL
- mobile broadband was not considered as an alternative (as indeed it would not have been a feasible substitute during that time period).

We therefore conclude that the elasticity estimate from the Shinohara study is unlikely to be representative of an elasticity in a forward-looking New Zealand market. At best, it could only be an upper bound. We know of no such suitable estimate.

In our experience it is notoriously difficult to find suitable price elasticities for telecommunications services. Deriving elasticities generally requires extensive data over a period of time, and the dynamic nature of the telecommunications industry and markets means that elasticities are not constant over time. Elasticities will be affected by the level of market maturity, the availability of substitutes and changing needs of the market.

Nonetheless, when we need to explore the effect of price changes on demand, we will estimate the impact using a range of price elasticity values. In this particular instance, we would recommend that the Commission focuses on the range 0.6-1.0 within its analysis (Exhibit 2.1), which is consistent with the estimates from the studies with the most recent data, namely Cambini[6] and Grzybowski[7].

6 Cambini. C. (2015), *Economics aspects of migration to fibre and potential welfare gains and losses from an uplift to copper prices*, 16 March 2015.

7 Grzybowski, L., Nitsche, R., Verboven, F. and Wiethaus, L. (2014), "Market definition for broadband internet in Slovakia – Are fixed and mobile technologies in the same market?", *Information Economics and Policy*, vol 28 issue C, pages 39-56.

Cross-price elasticity	*Welfare loss due to higher copper prices ($ millions)*	*Welfare gain due to network externalities ($ millions)*	*Net impact ($ millions)*
0.6	-93.8	+9.7	-84.1
0.7	-93.7	+11.3	-82.4
0.8	-93.7	+12.9	-80.7
0.9	-93.6	+14.6	-79.0
1.0	-93.5	+16.2	-77.3

Exhibit 2.1: *Sensitivity analysis of the cross-price elasticity in the Commission's model framework [Source: Commerce Commission]*

The application of price elasticities is based on a percentage change in price resulting in a percentage change in demand. The Commission assumes $79 to be the average retail price, with a $1 increase in the retail price (assuming 100% passthrough) corresponding to a 1.27% price increase.

The Commission does not appear to have evaluated the average price – instead it appears to have simply used the entry level retail price for DSL broadband plus telephone service charged by Spark New Zealand and Vodafone. Both these RSPs offer several plans, ranging from $79 to $99, as well as naked broadband plans from $69 to $89. The average price should be the average price paid for fixed broadband in New Zealand across all plans (including naked DSL) and providers.

2.2 UFB demand projections

The Commission's demand projections are obtained by a notional diffusion curve (expressed in relation to straight line growth). The starting point for this curve is 100,000 connections in 2015, increasing to 1,553,469 connections in 2029. This latter figure is 80% of the Commission's projected number of dwellings, which in turn was estimated to be the total number of households in 2014 with a constant assumed growth rate (1%) applied.

The Commission's assumption that all households within the UFB footprint – that is, 80% of its dwellings projection – will take up fibre by 2029 is likely to have a significant impact

on the estimated welfare effect. This will over-estimate the number of UFB-connected households.

Within the UFB footprint some households will be mobile-only, and some may have HFC cable connections. There may still be some households connected to copper. In any case, fibre connected households will be less than 100% of the addressable market within the UFB footprint.

Note that the proportion of households without a fixed line has increased from 8.4% in 2006 to 14.5% in 2013.[8] We would assume that this would primarily be due to the rise in mobile-only households.

We would suggest that the Commission explores the impact of various UFB market share assumptions: for example 75%, 80%, and 90% market share.

It should also be noted that the benefits from fibre migration will also depend upon the plan selected by the consumer. The entry level 30Mbit/s fibre service has only a small increase in utility over DSL compared to that of the 100Mbit/s or 200Mbit/s fibre services. The Commission's framework therefore needs to consider the mix of demand over the various fibre offerings.

We also note that the Commission's framework does not constrain demand to be lower than dwellings passed, however the diffusion curve appears to be below this level. If the Commission were to adjust the diffusion curve, we would recommend that this be checked.

The Commission's assumed growth rate in dwellings was stated in the model to be the average over the period 2004-14. A better solution would have been to use a growth rate derived from Statistics New Zealand's population projections[9], and apply an assumed household size (obtained from Statistics New Zealand). This would take into account anticipated demographic influences, including migration, rather than being based on past trends which may not be appropriate for the forecast period.

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8 Statistics New Zealand (2015), *2013 Census QuickStats about transport and communications*, February 2015. Statistics New Zealand did not report on mobile-only households.

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

We have compared the two approaches (Exhibit 2.2). While they are relatively close, as the Statistics New Zealand based projections are higher until 2025, the magnitude of any welfare effect (either positive or negative) is likely to be slightly greater using these projections than if the Commission's dwellings projections were used.

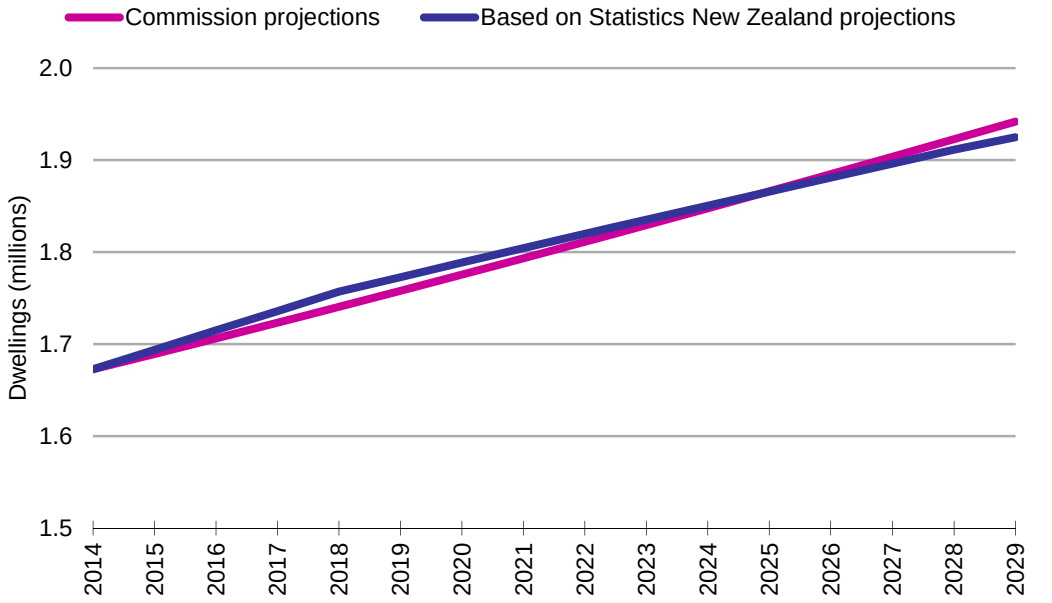

Exhibit 2.2: *Comparison of dwelling projections [Source: Commerce Commission, Network Strategies]*

2.3 Discount rate assumptions

In its estimation of the potential welfare effect, the Commission assumed a value for the discount rate:

> In terms of the discount rate, 10% has been used for the purposes of this analysis, although our results and conclusions are not materially affected by alternative discount rates.[10]

[10] Commerce Commission (2015), *Agenda and topics for the conference on the UCLL and UBA pricing reviews*, 2 April 2015, footnote 23.

In our view, this claim is premature. Changing the discount rate in the Commission's model framework has a material, if modest, impact on the estimated welfare effect (Exhibit 2.3). It should be noted that this framework includes only two welfare effects – benefits from faster migration to fibre services and losses due to higher prices for copper services – so that the net impact of changing the discount rate is to some degree diminished. The Commission has noted that its framework excludes a number of other considerations[11] – if its framework was to be expanded to include additional welfare effects, then the impact due to changes in the discount rate may well be increased.

Discount rate	*Welfare loss due to higher copper prices ($ millions)*	*Welfare gain due to network externalities ($ millions)*	*Net impact ($ millions)*
10%	-93.4	+19.4	-74.0
9%	-97.6	+20.9	-76.7
8%	-102.2	+22.6	-79.5
7%	-107.1	+24.5	-82.6
6%	-112.4	+26.5	-85.9

Exhibit 2.3: *Sensitivity analysis of the discount rate in the Commission's model framework [Source: Commerce Commission]*

The Treasury issues guidance on recommended discount rates to be used within cost-benefit analyses of public sector decisions[12]. The current default rate is 8.0% however it suggests 9.0% for the category "telecommunications, media and technology, IT and equipment, knowledge economy (R&D)". Given the reduced risk and lower returns associated with fixed telecommunications compared with the other components of this category, coupled with the social benefits associated with fixed telecommunications, we would recommend that a discount rate lower than 9% be used. Treasury's default of 8% would seem more appropriate.

11 *Ibid*, paragraph 70.

12 The Treasury (2015), *Current discount rates*, 15 March 2015. Available at http://www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/currentdiscountrates.

2.4 Welfare gains and losses

As stated above, the Commission's framework only examines two welfare effects, namely benefits from faster migration to fibre services and losses due to higher prices for copper services.

Loss due to increase in copper price

An increase in the copper price would result in a loss of consumer welfare for those customers remaining on copper. The Commission's framework estimates the impact due to this additional spend, where the UCLL price is increased by $1, which is then fully passed onto the retail price for copper services for all customers nationwide.

There are two problems with the Commission's approach.

Error in calculation of the increase in annual spend

The Commission calculates the additional annual spend based on end-of-year connections. Where connections are declining, this will under-estimate the welfare loss by $4.7 million (assuming cross-price elasticity of 1.2 and discount rate of 10%). The Commission should modify its calculation to use average connections over the year rather than the end-of-year connections.

Inappropriate copper market share assumptions

The calculation of additional fixed-line spend assumes that by 2029:

- none of the customers within the UFB footprint will retain copper
- all of the customers outside the UFB footprint will use copper.

As noted in Section 2.2, it is inappropriate to assume that fibre will capture 100% of the addressable market demand, and indeed there may still be some customers retaining copper services. Similarly, it is also inappropriate to assume that all customers outside the UFB footprint will use copper. In both instances there will be mobile-

only households, and there may be other options (HFC or fixed wireless) in certain locations.

We recommend that the Commission explores a range of different market share assumptions for copper in the UFB areas and outside the UFB areas. These should of course complement the UFB market share assumptions discussed in Section 2.2.

It should also be noted that for customers outside the UFB footprint the welfare loss due to higher copper prices will not be offset by any welfare gain due to fibre availability.

Network externality effects

The second effect examined by the Commission is that of network externality effects generated by faster migration to fibre:

> Such effects may arise where an additional subscriber to the UFB generates benefits to existing UFB subscribers. These could include the benefits from having more people to communicate with using platforms that are only available with ultrafast connectivity (such as high-definition video). An expanded UFB market may also induce higher levels of innovation and investment in new applications, which would benefit not only the marginal UFB subscriber but also existing UFB subscribers.[13]

The Commission considers two UFB demand scenarios:

- base case, representing its UFB projections (discussed in Section 2.2)
- "uplifted" UFB demand, where demand has been stimulated by the UCLL price increasing by $1 (with the additional demand defined by the cross-price elasticity assumption).

13 Commerce Commission (2015), *Agenda and topics for the conference on the UCLL and UBA pricing reviews*, 2 April 2015, paragraph 53.

The network externality value is calculated as an assumed percentage of the consumer expenditure on UFB services, with the welfare gain being the net present value of the difference between the two demand scenarios. That is, the welfare gain is dependent only on the incremental fibre connections.

Lack of data to support the network externality assumption

As the Commission notes, the main difficulty is to establish the value of the network externality (the assumed percentage). There is little information available on this effect in relation to fibre adoption – Professor Cambini cites only a single example (Briglauer[14]), for EU27 member states over the period 2004 to 2012[15].The network externality effect from this study is 0.7%. We are not aware of any other relevant studies.

Three values are used by the Commission: 2%, 25% and 50%. The first of these values is derived from a network externality surcharge (NES) in relation to mobile termination rates that was proposed by Ofcom in 2004[16]. It should be noted that the UK Competition Commission rejected the inclusion of the NES within mobile termination rates.[17]

Ofcom noted that there were "formidable" obstacles associated with the conceptual and practical estimation of the NES. A range of estimates was produced by different models, each providing what Ofcom described as "a relevant, although incomplete, perspective on the network surcharge".[18]

14 Cambini. C. (2015), *Economics aspects of migration to fibre and potential welfare gains and losses from an uplift to copper prices*, 16 March 2015, page 10.

15 Briglauer, W. (2014), "The Impact of Regulation and Competition on the Adoption of Fibre-Based Broadband Services: Recent Evidence from the European Union Member States", *Journal of Regulatory Economics*, 46(1), pages 51-79.

16 Ofcom (2004), *Wholesale mobile voice call termination* Statement, 1 June 2004.

17 Competition Commission (2009). *Mobile phone wholesale voice termination charges, determination*, 16 January 2009, section 4.

18 Ofcom (2004), *Wholesale mobile voice call termination* Statement, 1 June 2004, paragraph D.2.

We do not see how a network externality derived for mobile services could be relevant for fibre broadband services. Furthermore, there appears to be no justification for the Commission's other two values for this input.

We believe that there are likely to be some network externality effects, but given the availability of other technologies, including DSL, cable and mobile broadband, the value of the network externality for fibre is unlikely to be as high as the Commission's midpoint assumption of 25%. Most, if not all, the applications posited by the Commission can be used over copper broadband – the performance may not be as good as over fibre, but the user is not excluded from the application. This suggests that network externality effects, if present, are likely to be relatively small.

In the absence of any other information, the estimate from the Briglauer study would seem to be the only option for the Commission.

Error in calculation of the UFB expenditure

As in the case of the welfare loss due to higher copper prices, the Commission uses the end-of-year UFB connections rather than average connections to calculate UFB expenditure. As UFB connections are increasing, this error over-estimates the welfare gain – the net gain is around $1 higher than if average connections were used (based on the Commission's assumptions).

Would faster migration to fibre deliver greater benefits?

The optimal solution for delivering greater welfare benefits would be to have faster migration to fibre without an uplift to copper prices. In this instance there would be no offsetting welfare loss due to an increase in copper prices.

While it may be feasible that faster migration to fibre could be promoted by a larger increase in copper prices, there is considerable risk that the desired outcome will not be achieved due to other potential outcomes from higher copper prices such as:

- customers switching to technologies other than fibre, such as mobile broadband or cable
- RSPs responding with lower priced DSL plans that will attract the more price sensitive market segments and may have the effect of retarding fibre migration
- restricted growth in the total broadband markets due to affordability constraints, as broadband services become out of reach for low income segments
- a corresponding increase in fibre prices, if the RSPs seek to maintain a differential between copper and fibre prices to reflect the difference in service quality.

Therefore a larger increase in copper prices may not necessarily lead to greater fibre uptake but may increase the possibility of further welfare loss. Indeed, in our previous work investigating New Zealand fibre demand we have consistently found that fibre uptake cannot be driven solely by price. Other strong drivers for demand include the quality of existing broadband services, and the strength of demand for high-bandwidth applications[19].

Are there other factors that would affect consumer welfare?

In its analysis the Commission appears to consider that consumers have only two options: fibre or copper. In fact, the effect of increasing the retail DSL price could have several potential outcomes for the consumer, which will depend on the relativities of retail prices and the availability of alternatives:

- migration to fibre
- migration to mobile or wireless broadband (noting that mobile plans now have more generous data allowances)
- migration to cable, available as an option in areas with HFC services

19 Network Strategies (2013), *Business case for UFB uptake in the Wellington region*, 8 March 2013. See Section 4.

- migration to a lower priced DSL plan[20], possibly in combination with increasing usage of mobile broadband.

These alternative outcomes are not considered in the Commission's framework.

It is also noted by the Commission that there are other welfare effects not included within its framework:

- increase in retail UFB prices in response to increase in copper prices
- reduced investment and quantity by downstream providers
- negative externalities for customers remaining on copper
- supply-side constraints in connecting UFB customers
- welfare losses for customers switching to fibre.

To allow for such effects is likely to be just as challenging as with the Commission's draft framework due to the lack of recent relevant data. However we suggest that the Commission establish a range of plausible values for the key inputs driving these effects and explore the effects of the different assumptions in scenario analyses.

We have previously noted growth options in the New Zealand broadband market are limited to market segments with low income. Increasing the copper price will effectively put fixed broadband further out of reach for these segments, and indeed may result in an increasing digital divide if low income customers are forced to relinquish fixed broadband services due to affordability constraints. This is not a welfare effect currently considered by the Commission.

2.5 Producer surplus and investment in copper networks

An uplift in the UCLL price would result in an increased margin for copper. If we assume that this increase in the wholesale price will be passed through to the retail customer, then

20 Many RSPs have reduced the number of DSL plans on offer, compared with those of several years ago, however a likely response to the increase in the wholesale price could be the introduction of lower-priced plans with smaller data caps, solely aimed to ensure consumers have an option to avoid an increase in spend.

copper margins for the RSPs will remain unchanged. Thus the increase in producer surplus would accrue only to Chorus.

The terms of the 2011 Network Infrastructure Project Agreement (NIPA) between Crown Fibre Holdings and Telecom include a commitment that Chorus will actively support the Government's UFB uptake objective of maximizing connections to the UFB network[21]. As such Chorus has undertaken to prioritise investment in fibre access and take-up while minimising ongoing copper investment in future business plans. This includes specific limitations on Chorus' further copper deployment. In particular Chorus must:

- not build any new copper to the home networks in Chorus' UFB areas
- not deploy any further copper-based cabinets beyond those in the existing cabinetisation programme
- restrict VDSL deployment to sites that exist as at 31 December 2011.

In larger greenfields developments (over 20 lots) Chorus is only to offer fibre access services. The only exceptions to this are:

- in smaller developments where premises will not be passed by fibre for some considerable time
- where fibre access only would deprive a residential end-user of satisfactory fixed line services for a lengthy period.

This agreement restricts Chorus' ability to invest in copper in UFB areas. The only copper customers likely to see any benefits from increased investment in copper networks will be those located in the LFC areas, where Chorus is able to provide and invest in copper services in competition with LFC fibre. Chorus is also able to price differentially in these areas, that is it is able to price below the price cap given by the Commission.

21 Crown Fibre Holdings (2011), *Network Infrastructure Project Agreement, Telecom New Zealand Limited and Crown Fibre Holdings Limited*, 24 May 2011. See Schedule 1.

2.6 Summary

At a conceptual level, the Commission's model provides a useful framework to explore some of the effects on consumer welfare of an uplift in the TSLRIC price, however its initial results should be discounted due to:

- the lack of inputs appropriate for the New Zealand environment over the forecast period (due to lack of reliable and relevant data)
- some errors in the calculations
- a number of impacts are not considered by the framework.

The first of these points can be addressed by developing scenarios with input assumptions that are in our opinion more suited to the local market, in particular for:

- cross-price elasticities
- average retail price
- market shares for fibre, copper and other technologies
- UFB demand
- discount rate
- network externality.

The Commission must also address the calculation errors, namely the use of end-of-year connections rather than average connections to calculate benefits and losses.

Finally, the Commission needs to incorporate several additional welfare effects within its framework.

We also note that the loss in consumer welfare due to the increased copper price is extremely large and is unlikely to be offset by any welfare gains from faster fibre migration. Professor Vogelsang commented in regards to the Shinohara study:

> It also suggests that substantially more can be gained for FTTx migration by reducing the FTTx price than by increasing the DSL price.

Our expectation is that exactly the same conclusion will be reached if the Commission's framework was enhanced to be a full and accurate representation of welfare effects in the New Zealand market.

3 Uplift to the WACC

The Commission wishes to explore two key questions in relation to the WACC:

- justification to depart from a mid-point (that is, "best") WACC estimate
- if there is such justification, the most appropriate percentile.

In our view, there is no justification to support a departure from the mid-point WACC estimate and have previously submitted on this issue[22] on behalf of Vodafone. While our opinion on this issue has not changed, we have reviewed the Commission's framework that it proposes to establish an uplift to the WACC, based upon the approach developed by Oxera for electricity lines businesses in 2014[23]. It is recognised that the approach has some limitations, however the only alternative approach available was the Frontier-Dobbs model, which the Commission viewed as having greater limitations than the Oxera approach.

We have commented separately on the Frontier-Dobbs model, and have concluded that it is inappropriate for use in the current pricing review in its existing form, as is the CEG implementation of this model.[24]

Any such framework needs to explore the net effect due to an uplift in the WACC:

- increased costs to consumers through higher retail prices

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22 Network Strategies (2014), *Commission consultation on WACC for UCLL and UBA services*, 27 March 2014.

23 Oxera (2014), *Input Methodologies: Review of the '75th percentile' approach*, 23 June 2014.

24 Network Strategies (2015), *Examining welfare effects of UCLL and UBA uplift*, 11 May 2015.

- benefits to consumers by reducing the risks that investments in innovation or new technologies are delayed or prevented as a result of the WACC being under-estimated.

The Commission notes that:

> The framework currently focuses solely on whether a WACC uplift should be applied to reduce the risk of investment in innovative new technologies being delayed or not occurring, and does not consider the role of other factors (such as the costs to end-users of outages). However, the framework could potentially be adapted to incorporate other considerations which may be relevant when considering whether an uplift should be applied.[25]

In the Commission's view, this framework has three key parameters:

- *BCR* – the benefit-cost-ratio associated with investment in the new telecommunications network or service
- *p* – the combined probability that there is a major innovative new technology in prospect, when it might occur, and whether it would be regulated in way that made the allowed WACC for UCLL and UBA influential to investment in the new technology
- *m* – the margin by which the allowed WACC can be below the optimal WACC predicted by the model before investment in the new technology will not occur.

We believe it will be a significant challenge for the Commission to obtain information relevant to the telecommunications industry on these three parameters. It is likely that the parameters will need to be based on expert judgement, as past data may not prove to be a suitable guide for future technology, even if assuming it was possible to isolate the effects of WACC on investment in new technology.

It should also be noted that we do not believe that it is appropriate to use information derived from electricity lines businesses for estimates of the statistical parameters associated with the WACC or WACC inputs (that is, means and standard errors). Such information is not relevant for the telecommunications industry:

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25 Commerce Commission (2015), *Agenda and topics for the conference on the UCLL and UBA pricing reviews*, 2 April 2015, paragraph 88.

> …while these assumptions may be applicable for EDBs, it does not follow that the assumptions should also apply to the problem of deriving a WACC for the HEO. The WACC parameters for UCLL and UBA were based on a different sample of companies, and so the sample means and standard errors will differ from those of the samples used to derive the EDB WACC parameters.
>
> If these assumptions differ, then the WACC's statistical distribution will also differ.[26]

Another assumption proposed by the Commission is that the new network (with the new technology or service being deployed) has the same asset value as the existing network.[27] This is a simplistic assumption. The new network could have a greater asset value than the existing network, or it may even have a lower asset value – noting that a key driver for the introduction of some new technologies in recent times has been the lower costs of the new technology. This then creates a new challenge or assumption: what would be the value of the new network?

The uplifted WACC would apply to both the existing and the new networks. It is important that the framework does not ignore any potential welfare loss due to higher prices on the existing network.

We therefore find that the Commission's framework for exploring a potential WACC uplift has considerable limitations. Due to the lack of appropriate data there is a strong risk that any resultant estimates will be misleading in relation to the UCLL and UBA process.

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26 Network Strategies (2015), *Review of issues from UCLL and UBA submissions*, 20 March 2015.

27 Commerce Commission (2015), *Agenda and topics for the conference on the UCLL and UBA pricing reviews*, 2 April 2015, paragraph 117.2.

4 Monte Carlo simulation

The Commission is seeking views on whether a Monte Carlo approach, as described by CEG in its submission[28], should be considered within the context of the FPP.

While it would be possible to conduct a Monte Carlo simulation, the Commission must be mindful that the assumptions used by CEG in its submission were inappropriate in this context. We have previously commented in detail[29] on CEG's assumptions, and noted that:

- CEG assumed that only three of the WACC inputs – tax-adjusted market risk premium (TAMRP), equity beta and debt premium – had associated uncertainty. Other parameters – such as leverage – are also estimated from sample data and thus also have associated uncertainty which was ignored by CEG
- statistical parameters such as means and standard deviations should be based on up-to-date data that is appropriate for telecommunications businesses
- there are relationships between the various financial inputs, which means that the assumption that the inputs are statistically independent is flawed
- CEG assumed that the various inputs had normal statistical distributions, which may not be appropriate.

It would be possible to undertake a Monte Carlo simulation which addresses these deficiencies.

If the Commission was to undertake such an analysis it would be necessary to use assumptions and inputs that are relevant for the New Zealand environment. This

28 CEG (2015), *Uplift asymmetries in the TSLRIC price*, February 2015, Section 6.

29 Network Strategies (2015), *Review of issues from UCLL and UBA submissions*, 20 March 2015, Section 6.6.

information would, however, be a significant challenge to obtain. Even if the Commission was able to source appropriate information, we anticipate that the end result is likely to deliver a fairly wide range of results, indicative of a large standard error, which will probably not facilitate the Commission's task in choosing an appropriate value within the range.

The following tasks would, in our opinion, prove to be particularly difficult:

- Determining the uncertainty associated with various inputs, when many inputs would have limited information available, particularly data that would be relevant in a current or forward-looking New Zealand context
- Determining the statistical distributions of the inputs – note that it is unlikely that normal distributions could be assumed in all cases, as many distributions would be truncated or skewed
- Estimating the parameters for the distributions of the various inputs when only limited data is available
- Many of the inputs would not be statistically independent, and thus the various relationships between the inputs would need to be quantified and included within the Monte Carlo analysis.

We therefore do not consider that such an analysis would provide great value.

The Commission has also noted in relation to the WACC percentiles:

> The High Court, in its merits appeals decision, and several submitters highlight that the distribution from which the percentile is chosen is not a true statistical distribution. As is discussed further in Chapter 4, we agree; however, we consider that it represents a reasonable estimate of the likely estimation errors. We use the term 'WACC percentile' as short-hand only, not in its true statistical meaning.[30]

30 Commerce Commission (2014), *Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services*, footnote 12.

Thus the derivation of a true statistical distribution via a Monte Carlo analysis actually represents quite a different approach to that previously used by the Commission in deriving WACC percentiles.

Our recommendation is that rather than undertaking a Monte Carlo analysis, the Commission should identify the key input parameters and assumptions, and use its TSLRIC model to estimate prices of a range of potential input scenarios, each of which represents a particular combination of inputs. The Commission would also have the option to assign weightings to the various scenarios based on its own expert judgement.

While a much less sophisticated approach than a Monte Carlo simulation it does not rely on the availability of extensive suitable data to estimate the statistical distributions and parameters required for all the sources of uncertainty. Such a scenario analysis would also enable the Commission to give greater weighting to preferred scenarios, if required.

5 Concluding remarks

The Commission's model is a useful conceptual framework for examining the welfare effects of an uplift in the TSLRIC price. However the current version does have some issues:

- lack of inputs appropriate for the New Zealand environment over the forecast period
- some minor errors in the calculations
- a number of impacts are not considered by the framework.

Clearly, any calculation errors must be addressed, and additional welfare effects incorporated into the model framework.

We recognise that it will be extremely difficult to obtain relevant and timely data to support the estimation of some of the assumptions – in particular for cross-price elasticities – but this can be addressed by developing a selection of scenarios representing combinations of inputs. Analysing the scenario results should provide some insight into the welfare effects of a potential uplift and assist in the Commission's decision process.

With regard to a framework for exploring the effect of an uplift to the WACC, while we do not believe any such uplift is required, we find that the Oxera approach is preferable to the Frontier-Dobbs model as implemented by CEG. Nonetheless the Oxera approach does have considerable limitations which will compromise its ability to aid in the Commission's decision process and may indeed introduce regulatory error.

Finally while a Monte Carlo simulation for investigating the uncertainties within the WACC could be undertaken, it would be necessary to ensure that the analysis encompasses variation within and the relationships between the WACC parameters. However we

anticipate that the resultant simulation would produce a WACC distribution with a relatively large standard error, which would not provide reassurance of a reduction in regulatory risk.