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Submission for Chorus in response to

Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 December 2014)

and

Process and Issues Update Paper for the UCLL and UBA Pricing Review Determinations (19 December 2014)

Chorus

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EXECUTIVE SUMMARY

1 This is Chorus' submission on the Commerce Commission's draft determinations of 2 December 2014 for the Unbundled Copper Local Loop (**UCLL**), Sub-loop UCLL (**SLU**) and Unbundled Bitstream Access (**UBA**) services.

2 The Total Service Long Run Incremental Cost (**TSLRIC**) based prices set by the Commission in its pricing review determinations will set incentives for investment, innovation and competition for a period of at least 5 to 7 years. The model developed by the Commission for this regulatory period may also be used in subsequent regulatory periods. This means that decisions made by the Commission now will be relevant to the telecommunications market in 2020 and beyond.

3 The Commission's task is to set TSLRIC based prices which promote competition in the long term benefit of end-users. With structural separation and the creation of an open access wholesale-only network operator, all retail service providers (**RSPs**) operate from a level playing field. Ongoing investment and innovation incentives at the wholesale level will continue to provide a platform for strong retail competition, encouraging new entry and multiple new retail propositions based around HD video streaming services.

4 Wholesale services, including the regulated UCLL and UBA services, are a key platform for enhanced competition. Setting the right TSLRIC based price point is essential to promote investment to deliver the growth in bandwidth, both copper and fibre-based, which has the potential to deliver large social and productivity gains to end-users through enhanced competition for delivery of new and better services over the regulatory period. Similarly, incentivising the transition to fibre is central to unlocking those benefits.

5 Simply put, setting an appropriate price now opens up the potential for better broadband and more competitive and innovative retail offerings for all New Zealanders over a network that is stable and resilient – not just in urban areas where UFB is being rolled out, but in rural New Zealand too. It will also send signals that will ultimately impact the quality and timeliness of offerings to end-users – both of which affect the potential to increase consumer welfare and the long term benefit of end-users.

6 All external experts agree that the risks of setting an inefficiently low price far outweigh the risks of erring in the opposite direction, and risk missing the benefits of providing regulatory signals that will incentivise and enable ongoing investment and innovation.

7 Against this background, setting an appropriate price requires a modelling approach that reflects:

7.1 a predictable and orthodox application of TSLRIC that supports investment incentives; and

7.2 the actual costs of and constraints on building and operating a network in New Zealand. The modelled TSLRIC must be a reasonable proxy of costs

that would be incurred actually to build and operate a network if the statutory purpose is to be met.

8 With Chorus and the other local fibre companies (**LFCs**) currently rolling out fibre networks, the Commission can draw on information about the actual costs of rolling out a network in New Zealand today. This is not asking the Commission to model Chorus' actual network– it is about using information about the real costs and constraints that any hypothetical entrant would encounter building a network in New Zealand.

9 In undertaking the TSLRIC exercise, the interim prices set by the Commission should not act as an anchor point. The difference between the initial pricing for the regulated services determined by international benchmarking and the final pricing determined using TSLRIC is that the final price is grounded in the New Zealand reality. This accounts for the difference in the interim and expected final prices.

10 Consistent with Chorus' publicly stated expectations, the Commission's draft model has led to a conclusion that rebalancing between UCLL/SLU and UBA prices is required. This rebalancing is appropriate, both from a TSLRIC cost perspective, and in terms of the broader incentives this drives for unlocking the benefit of better broadband for New Zealand.

11 These results align with a number of sense checks. At their simplest, the draft determinations say that a nationwide point to point (**P2P**) fibre network can be rolled out in all urban and rural areas in New Zealand for an average price of $38.39 per month. This is below the entry level UFB fibre price[1] for services in urban areas - with higher rural costs and potential future investment still to be accounted for. It is also consistent with the valuation sense checks that we have presented over the last year.

12 Put another way, while the Commission's draft determination provides an under-estimate of TSLRIC, this appears to be attributable to identifiable issues in the modelling approach which, if corrected, will provide an outcome that is consistent with available alternative estimates, and with the regulatory purpose.

13 The Commission's final determination will set the price for UCLL, SLU and UBA services. The UCLL price will also flow through and apply to the UCLF service. Chorus' own modelling of an FTTN/Copper network showed that the UCLL and SLU prices would be about the same, and the UCLFS price would be higher. The Commission, in choosing a fibre MEA, has used an aggregation approach to derive the SLU price.[2] However, under both scenarios, it appears that all costs are recovered (once the omissions and oversights in the Commission's model are addressed as outlined in this submission).

[1] The entry level UFB fibre price increases by $1 every year. It will be $38.50 from June 2015, and $42.50 by the end of the regulatory period. The draft determination at page 50 appears mistaken when it references that the TSLRIC prices are greater than the entry level fibre price.

[2] The Commission has not derived a UCLF price from the fibre modelling.

Focus of our submission

14 The Commission's draft TSLRIC model and the model developed by Analysys Mason for Chorus are broadly methodologically aligned on first order approaches. We agree with the Commission's methodology on a number of key framework issues. These include:

14.1 an orthodox approach to TSLRIC should be the starting point, consistent with the promotion of market predictability and investment efficiency;

14.2 Optimised Replacement Cost (**ORC**) is the appropriate asset valuation for all assets required to provide the service;

14.3 a scorched node approach to modelling the service provision network;

14.4 Chorus' parameters, including its operating costs, are the appropriate starting point for the modelling exercise; and

14.5 if a fibre model is used, the Commission should model a point-to-point (**P2P**) model.

15 The Analysys Mason FTTN/Copper models were provided to the Commission on the 1 December 2014 deadline and are available to TERA and other parties. With both FTTN/Copper and FTTH P2P models available to the Commission, at this stage in the process, the data and parameters are the critical focus.

16 This submission comments on the detailed implementation of the Commission's proposed approach to modelling TSLRIC, focussing on material issues we have identified in the timeframe available. There are a number of areas where we believe the assumptions in the Commission's model do not take account of all relevant considerations or are not based on the best available evidence. Our analysis of TERA's modelling will continue. While recognising that some omissions and oversights can occur in modelling, at this stage in the process, our advisers have focused on material issues that have been identified at this time.

17 Some of the material issues identified include:

Issue	Implication
Omissions and oversights - modelling	
TSO islands: by removing road sections outside of the TSO footprint, TERA have effectively created "islands" where end-user premises are no longer connected to their parent exchange. As a result, the modelled network is not able to provide the UCLL service to premises located within an island. In other words, if Chorus only deployed network within the TSO areas in 2001, many of the customers in those areas would not have been able to make or receive calls.	Costs of 10,000 km of route length are excluded from the cost model. This affects approximately 300,000 premises in the Commission's model.

Issue	Implication
TSO footprint data integrity: the model has excluded a number of premises from the Commission's TSO footprint due to end-user locations that are incorrect.	Modelling assumes that network serving 47.5% of road length has been built since 2001 in order to service 6.4% new connections. This equates to approximately 70,000 km of road sections. 50% of end-user premises have been coded with an incorrect location, with 20% relocated by more than 1 km.
End-user connection: the cost of the external termination point (**ETP**) and, in some cases, wiring to the ETP is excluded.	The ETP forms part of a lead-in and is included in the UCLL service. All wiring before the ETP should be included.
Omissions and oversights – accounting for legal or planning requirements	
Straight line lead-ins and property boundaries next to road: the model has assumed lead-ins are deployed in a straight line between the end-user premise and the road, making no allowance for real-world considerations. In addition, lead-in lengths do not include the distance between the road and the property boundary, so excludes footpaths and council berms.	Road crossings distance does not include footpaths or council berms. A straight-line lead-in to all end-users premises is impractical to achieve deployment. The Danish national regulator applies a mark-up to lead-in lengths to address both of these considerations. 15% was applied by Analysys Mason in 2011 and 20% by TERA in 2014. Correction of both of these issues materially increases the lead-in length.
Aerial poles do not meet legal requirements: pole assumptions (4.5 metre height) in the model would mean cables hang lower than the legal minimum clearance (between 5.5 to 6.5 metres) for road crossings.	Unit cost of poles is too low when a pole height of between 5.5 and 6.5 metres is required. Poles must also be sufficiently strong to support electricity lines company distribution wires.
Too few aerial poles: due to the unrealistic deployment assumptions, aerial poles are not in the right location to connect customer premises.	A materially greater number of poles is required to support the modelled network.
Fixed Wireless Access: the use of FWA as the MEA for UCLL, limited to 250 kbps.	FWA is not capable of delivering either the full functionality or core functionality of the regulated service: in particular, it is not capable of delivering an unbundled Layer 1 service to RSPs.

Issue	Implication
Omissions and oversights – accounting for best available evidence of costs and constraints	
Lack of robust trench costs: trenching costs are based on Beca's analysis which is based on limited geological information in urban areas and based on quotes from a small number of contractors.	Average costs of trenching per metre used are too low when compared with actual costs of trenching in many urban exchange areas. Our experience is that the actual average trenching cost is materially higher than Beca's estimates. Our experience is that the actual average trenching cost is materially higher than Beca's estimates. For example, our year 3 and year 4 UFB trenching costs in Auckland are at present averaging **more than double** Beca's estimated Auckland rates and, in the Auckland CBD, **more than ten times higher** than Beca's estimates.
Opex efficiency adjustment: operating costs adjusted by a discount of 50% to reflect fibre efficiencies.	Best available evidence suggests that network operating cost savings for a fibre network compared to a legacy copper network are 15% to 30%. The Commission's model also requires upwards adjustment for the increase in aerial deployment, which carries higher operating costs than underground networks. In addition, the efficiency adjustment is applied to non-network costs that are static, such as corporate overheads and regulatory levies.
Optimisation of optimised operating costs: the opex efficiency adjustment has been applied to the notional costs of operating a network with an already optimised line fault index (**LFI**).	The Commission's fibre efficiency adjustment double-counts any efficiency gains from the Commission's LFI adjustment.
No spare capacity: model does not include any allowance for spare capacity.	The Danish regulator provided for 25% spare capacity in the distribution network and 30% spare capacity in the feeder network to account for future growth.
Judgements	
UBA: the model implicitly assumes growth in throughput for UBA to an average of 2.214 Mbps per customer, where growth beyond that is not accounted for.	Chorus' estimate is average throughput of will exceed the dimensioned service before the end of 2020. Investment for growth beyond that period is not accounted for. Bandwidth demand may increase further depending upon, for example, the entry of online TV from new and/or existing RSPs.

Issue	Implication
	Aligning expectations for the scope and growth of the regulated service will send signals for investment and transition.
WACC: the draft WACC is below the WACC of local fibre companies in New Zealand. The WACC premium is also below the WACC premium for electricity lines businesses in New Zealand and telecommunications companies in 11 European countries, Australia and the United States.	The cost of capital must be set at a level that provides the financial return investors would require given the risk of the investment and that investors have alternative options. Reliance on a one month debt average is a gamble linked to the date of the final FPP determinations. Further, no hypothetical (and certainly not a real world) provider could refinance around $1.8 billion in debt in a month and be willing to incur the additional cost of rescheduling its refinancing arrangements as the date of conclusion of the FPP process has changed from December to April to September.
Asymmetries in WACC and TSLRIC estimates: the Commission has not made any adjustment to its estimate of the WACC or TSLIRIC price to account for asymmetric error costs or risks associated with setting the price "too low".	Both the WACC and TSLRIC should be set having regard to the asymmetric consequences of error and asymmetric risk.

18 If the omissions and oversights alone are corrected, we expect that the TSLRIC price will be at or above 2011 levels. This is consistent with views consistently communicated by Chorus over the last 2 years.

19 These issues are described briefly below. We have a number of other concerns which we address in the body of our submission.

20 Where we have identified an issue with the Commission's model, we have asked Analysys Mason to recommend a solution. These solutions are set out in the Analysys Mason report provided with this submission. Chorus also provided its own model from Analysys Mason within the Commission's timeframe of 1 December 2014, and many of the parameters in that model (such as our evidence of actual trenching costs) are also more robust than what is currently in Beca's report or the Commission's model.

UCLL and SLU services

The identification of costs required to serve TSO areas

21 We believe that it is incorrect in principle to assume that hypothetical "capital contributions" will pay for capital costs required to provide the regulated service. However, if assumed capital contributions are to be deducted when assessing

from TSLRIC costs, then the Commission should make significant corrections to its implementation of the decision to remove costs outside of areas which Chorus is required to serve under the TSO instrument (the **TSO areas**).

22 We have identified two material issues in the Commission's approach which require correction:

22.1 the TSO areas identified by the Commission do not include significant numbers of end-user premises which were in fact connected to the copper network in December 2001; and

22.2 the TSO areas drawn by the Commission are, in many cases, isolated "islands" of network which are not connected to Chorus' network. Indeed, 46 exchange buildings are not included in a TSO area. This means that the Commission has excluded costs of network required to connect end-users premises which are within the identified TSO areas to the Chorus network. Capital costs of an additional 10,000 km of route length need to be included in the model.

23 These issues are illustrated by way of example in Canterbury, in Figure 1 below. The purple dots are end-user premises connected to the Chorus network in 2001 which are not included in the Commission's TSO areas. The TSO areas are shown in white (and described by the Commission as "TSO polygons"). Many of the white "islands" are disconnected from other areas of the network, including exchange buildings, and therefore would not be capable of connecting to the Chorus network.

24 It is also important that any capital contributions are treated as a true "one off" payment by the end-user, as is the case in practice. It should not be assumed that the end-user will continue indefinitely to contribute the cost of replacement assets outside TSO areas.

Figure 1: Canterbury TSO 2001 end-user connections not included in the Commission's TSO area

Trenching costs

25 In the Analysys Mason UCLL model made available to the Commission the day before the draft determinations were published, we have, provided the Commission with detailed trenching cost information based on Chorus' UFB build. Chorus' UFB and RBI build data is actual marketplace cost information. While Analysys Mason calculated a blended average trench cost by CSA it is:

25.1 based on highly disaggregated data, and so reflects the full spectrum of terrain types, local authority rules, and cost characteristics of all ESAs in New Zealand;

25.2 recent, reflecting transactions in the last two years for UFB and RBI programme costings, which are based on prices reached in the open market in ESAs in which Chorus is present;

25.3 reflective of a large scale network rollout over a short time and the economies of scale inherent in a large build. Beca's estimates specifically exclude consideration of such efficiencies.[3]

26 The incomplete Beca trenching costs relied on by the Commission are materially lower, particularly in urban areas, than the costs actually incurred by Chorus in deployment of UFB and RBI. This is demonstrated in Figure 2 below, which shows the difference between Beca trenching costs and costs used in the Analysys Mason model, based on Chorus UFB build data, for each exchange area. For example, our year 3 and year 4 UFB trenching costs in Auckland are at present averaging **[CI:]**, more than double Beca's estimated Auckland rates) and, in the Auckland CBD, about **[CI:]**, which is more than ten times higher than Beca's estimates.

27 The actual costs incurred by Chorus in UFB and RBI deployment are better evidence of the costs that a real-world HEO[4] would face than the Beca analysis. This view is confirmed by a report from Aurecon Group, a firm of expert construction and infrastructure consultants.

28 The Beca analysis is limited to estimate-based quotations from nine contractors, rather than actual costs. It does not include an assessment of soil and rock classifications for city and major suburban areas and instead assumes those areas are all built on medium/hard soil or reclaimed fill. Much of Auckland is built on scoria.[5] Beca's analysis does not adequately reflect the variability in key cost drivers, for example, traffic management and reinstatement cost between urban and rural areas. These deficiencies are significant because the Commission's assumptions in relation to capital contributions mean that its cost model is more weighted to urban deployment than rural deployment.

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[3] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), page 9.

[4] Chorus has adopted the Commission's use of the term "hypothetical efficient operator" in its draft determination in place of the term "hypothetical new entrant". Chorus understands the HEO concept to be essentially consistent with the HNE concept previously used by the Commission and orthodox TSLRIC, and uses it in that sense.

[5] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in NZ" (25 November 2014) at page 4.

[CI:

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Omitted costs

29 The Commission's model should include a number of material capital costs associated with network deployment, including installation costs and service company overhead costs. These are real costs associated with network deployment in New Zealand that any HEO would incur, and are a necessary component of the agreements that any HEO would reach with service companies.

Aerial deployment

30 We have provided evidence in previous submissions of the real-world complexity of achieving aerial deployment in the context of modern planning regulations and limitations on access to aerial distribution networks maintained by electricity lines companies. The Commission appears to have "assumed away" much of this complexity and cost by adopting a simple hypothetical scenario in which the costs of aerial deployment are shared equally between the HEO and electricity lines companies, with each taking the benefit of Chorus' existing resource consents.

31 We have concerns about such a significant abstraction from the reality of network deployment in New Zealand. Such an approach risks overstating the feasibility of aerial deployment and excluding from the Commission's model costs that the HEO would face.

32 Rather than using the 2% aerial that exists today in Chorus' network, the Analysys Mason modelling used an estimate of 20% which is the real world "target" for UFB.

33 However, even on the Commission's preferred scenario, additional assumptions are made that do not reflect actual legal and practical constraints on deployment. In particular, the Commission has based its unit cost for distribution poles on the lead-in poles currently deployed by Chorus in its network. But these poles are not structurally capable of carrying both electricity and telecommunications, which is the deployment model assumed in order to justify the 50% reduction of aerial deployment costs. The Commission should use unit costs for poles that can carry both types of network. Beca gives an indicative rate of $5,000 per pole in its report, which is broadly in line with Chorus' UFB experience.

34 Further, in relation to aerially deployed lead-ins, the Commission has modelled an aerial network with 4.5 m distribution poles deployed on a single side of the road only, and lead-ins strung across the road to serve end-user buildings on the opposite site of the road. The legal requirement for minimum clearance of a road in New Zealand is 5.5 m or, for some electricity lines, 6.5 m or 7 m. Network deployed across a road from a 4.5 m tall pole cannot meet this clearance rule. In addition, in practice, given limitations on road-crossing cables, lead-in poles would be deployed on the minor side to limit the number of road crossings where multiple addresses are served from a Copper Cable Terminal (**CCT**)/Fibre Access Terminal (**FAT**) or where the served building is not high enough to ensure a 5.5 m minimum road clearance.

35 We estimate that a material number of minor side poles should be added to the Commission model to correct this issue.

Lead-ins

36 Lead-in connections are a significant contributor to monthly charges. There are a number of material issues with the way in which lead-in lengths were calculated in the Commission's model.

37 First, TERA have not included the distance between property boundaries and the road surface in their model: effectively, the area of the road reserve that is not the physical road itself (e.g., the berm/footpath).

38 Second, TERA have also assumed that a lead-in may be deployed in a straight line between the end-user building and pole. But, in the real-world, physical obstacles (buildings and trees) and legal requirements (including under Chorus' resource consents) mean that lead-ins are often not able to be built in straight lines. In its model for the Danish regulator, TERA have made an allowance of an additional 20% of lead-in length for this (Analysys Mason allowed an adjustment of 15%).

39 If these issues are corrected, Analysys Mason's review of a sample of properties suggests that total lead-in length could increase materially.

40 The issues with the assumptions made in relation to aerial deployment and lead-ins are illustrated in the following diagrams:

40.1 Figure 3 illustrates the network as actually deployed by the Commission's model. This includes an error in the algorithm of the calculation of the number of CCT/FAT required to be deployed;

40.2 Figure 4 illustrates the network as we believe was intended to be deployed by the Commission's model. As can be seen from the diagram, many of the assumed lead-ins could not physically reach the end-user in a straight line, and consent for the number of road-crossings required could not be realistically obtained; and

40.3 Figure 5 illustrates a realistic network deployment for the same street, taking account of practical and legal requirements.

41 The Commission should revise its model to ensure that it is a realistic depiction of network deployment in New Zealand that takes account of practical and legal constraints that apply to all network operators.

Figure 3: Aerial illustration of bug in algorithm of TERA model

Figure 4: Illustration of aerial deployment description in TERA documentation

Figure 5: Likely aerial deployment by Chorus

Adjustments to non-network operating costs

42 We support the use of Chorus' actual accounts as the basis for assessing the non-network operating costs that would be incurred by an HEO. However, we have concerns with the efficiency adjustments made by the Commission.

43 The Commission has applied a series of adjustments which appear to involve a material element of double counting. The Commission has reduced Chorus' actual costs to reflect that it has a higher LFI than international comparators for a new copper network, and has then applied a discount to reflect cost differences between that notional new copper network and a new-build fibre network. But because the benchmarks for the second discount compare a *legacy* copper network to new fibre build, this methodology will result in double-counting efficiency gains.

44 The Commission has applied a 50% discount for the difference in non-network operating costs between copper and new-build fibre networks. We have two concerns with the scale of this discount:

44.1 It is based on limited forecasts and does not reflect the best available evidence. More recent studies which reflect actual experience of operating fibre networks in multiple jurisdictions, including both Europe and the United States, demonstrate a lower operating costs saving, in the order of 15% to 30%, between legacy copper networks and new-build fibre networks.

44.2 It is incorrectly applied to operating cost categories which are not dependent on technology choice. The discount should not be applied to non-technology cost categories (such as rates and Commission levies).

45 Finally, an upwards adjustment to the operating costs an HEO would incur is required to reflect the materially higher proportion of aerial deployment in the network modelled by the Commission (36%) than in Chorus' network (less than 2%).

UBA service

46 TSLRIC is an estimate of forward-looking costs and, as the Commission has repeatedly emphasised, a proper approach to section 18 requires it to give more weight to dynamic efficiency over static efficiencies. Accordingly, it is important that the Commission ensures its approach accounts for likely developments in the telecommunications industry, including future growth.

47 If the Commission does not dimension the modelled network in a way that will enable growth in demand to be met, Chorus should not be expected invest beyond what the Commission has dimensioned.

48 The TERA Model Specification records that the Commission has modelled a UBA service which is capable of supporting both ADSL and VDSL technology and dimensions a single 1 GigE backhaul link from each DSLAM to the FDS. This means that, even at full capacity, the highest average bandwidth per user able to be supported by the modelled network is 2.214 Mbps. Based on our assessment of expected growth in peak hour demand per end-user, the Commission's UBA

model is not likely to adequately account for demand in the first five years of the regulatory period or for investment for or ahead of demand thereafter.

49 The Commission's UBA model also excludes a number of costs which a real-world network operator would incur. These include the costs of:

49.1 installing equipment used to provide the service; and

49.2 increasing the size and dimensioning of facilities at cabinets required to support the UBA service.

50 Finally, the Commission also excludes the capital costs of significant volumes of DSLAMs, apparently on the basis that Chorus received funding for these assets from the Rural Broadband Initiative (**RBI**) programme and that an HEO could expect to demand and receive a similar capital contribution. However, Chorus did not receive funding for DSLAM deployment through RBI and there is no reason to think that an HEO would require capital contributions for DSLAMs.

Common issues

WACC

51 The Commission's draft Weighted Average Cost of Capital (**WACC**) of 6.47% is a material underestimate of the appropriate return required to invest in fixed telecommunications infrastructure. It is extremely low by all New Zealand and international comparisons.

52 The Commission's estimate of the WACC departs in important respects from its input methodology determinations under Part 4 of the Commerce Act 1986 in ways that undermine regulatory certainty and stability. This departure, when unable to be justified by reference to more stable estimation methods or the specific circumstances of the telecommunications industry, means that some parameters are not based on the best available evidence.

53 A key example is the Commission's draft asset beta of 0.40, which is restricted to an analysis of beta over a five year period, including periods directly affected by the global financial crisis and European sovereign debt crises. Had the Commission adhered to the methodology it used in its Part 4 determinations, and which has been endorsed by the High Court, or looked at a comparator like BT Openreach, an asset beta of 0.50 would have been generated. There is no sound reason for the Commission's change in approach for asset beta in the telecommunications context.

54 In contrast, the Commission has used a risk free rate based on a one-month average, it appears primarily because this is the approach it used in its Part 4 WACC determinations. But this is a case where regulatory predictability and the circumstances of telecommunications companies (reflected in the Commission's previous Decision 672), supports use of a more stable risk free rate average.

55 In the result, the Commission's proposed WACC premium would place Chorus as the lowest of any regulated telecommunications company in a comparator group of 11 European jurisdictions, the United States and Australia. This strongly suggests that the Commission's approach to WACC is not producing a reasonable

outcome, the reasons for which we elaborate in this submission and in the expert report from CEG accompanying it.

56 Standing back, reliance on a one month debt average is in essence a gamble linked to the date of the final FPP determinations. Further, no hypothetical (and certainly not a real world) provider could refinance around $1.8 billion in debt in a month. Nor, extended to a logical application of the apparent thesis behind this, would it be willing to incur the additional cost of rescheduling its refinancing arrangements as the result of a moving conclusion date of the FPP process - December to April to September.

Demand

57 The Commission is requested to reconsider its inclusion of demand for LFCs in the demand of the HEO. Chorus by definition does not serve this demand, and therefore even if it were as efficient as the HEO, could not recover the TSLRIC costs of providing the service.

Allowance for asymmetries

58 Ongoing investment in telecommunications is essential to drive economic growth, productivity and well-being. This is recognised by the Ministry of Business, Innovation and Employment in its recent "*Briefing to the Incoming Minister of Communications*", which states that the use of data and voice services can enhance productivity across all sectors of the economy and that it is therefore critical that key telecommunication networks are reliable, secure and resilient.

59 Broadband services are a growth business. Bandwidth on Chorus' network has been growing exponentially due to increased connection volume and increased bandwidth usage per connection. New Zealand is starting to see the benefits of changing and emerging competition driven by demand from end-users for better broadband services, including entry by new participants and the development of new services based around HD streaming capability.

60 Wholesale services, including the regulated UCLL and UBA services, are a key determinant for the quality of services able to be offered to end-users and the platform for competition. Promoting investment in, and transition to, better quality open access wholesale services, both copper and fibre-based, will deliver large gains to end-users through enhanced competition for delivery of new and better services.

61 It is therefore critical that incentives to invest in the wholesale services used to support this growth, both copper and fibre, are promoted.

62 The importance of setting an appropriate TSLRIC price in this context should not be underestimated. The return on UCLL/UBA necessarily has a bearing on the return to be expected for all Chorus investment. This means the price payable for regulated services affects investment not only in those services, but also in new generation access. The simple fact is that Chorus, as a structurally separated network business, cannot make the same trade-offs that a vertically integrated network company could make, and which are being made by fixed line operators in the US (which can turn off, and even sell off, components of their copper networks when rolling out fibre).

63 In addition, the UCLL and UBA prices will:

63.1 set build incentives for other network operators, and end-users will benefit from investment and innovation by the industry as a whole; and

63.2 set incentives for end-user migration to fibre services. The draft determination price point is below the entry level UFB fibre price[6] for services in urban areas.

64 In ensuring that competition is promoted for the long-term benefit of end-users, it is obviously critical that the Commission improve the TSLRIC model to the extent possible, by addressing omissions and oversights.

65 However, as the Commission has recognised, there is an inherent asymmetry in setting the price point of regulated services which results from uncertainties around a range of TSLRIC inputs, and an inability to fully account for asymmetric risk. We have provided expert reports on this topic that conclude that, given these issues, the case for "erring on the high side" is clear.

66 Consistent with the Commission's conclusions in the regulation of other industries, an uplift to the WACC estimate to reflect estimation errors in that estimate, combined with an uplift to the estimate of the final TSLRIC price to recognise residual risks not accounted for in the Commission's WACC estimate or its modelling choices, is therefore appropriate.

Backdating

67 The Commission's preliminary view is that it would be likely to best give effect to the section 18 purpose statement by backdating the final FPP prices for UBA, UCLL, SLU and UCLF to 1 December 2014, but not earlier. We welcome the Commission's preliminary views, which we believe will go some way to enhance certainty and incentives to invest. But the Commission can and should go further and backdate the UCLL, SLU and UCLF services to the date of the UCLL IPP determination to ensure that Chorus recovers its efficient costs, avoid windfall gains to RSPs and incentivise efficient behaviour by the industry in relation to future determinations.

68 In assessing the policy justification for backdating, the general incentives towards efficient investment and promoting competition for the long term benefit of end-users must be the central consideration. While the Commission raises concerns about the impact of backdating on individual RSPs, it is relevant that the amount to be paid in backdating is commensurate with the size of the operator. Chorus will offer a repayment scheme based on the credit worthiness of the RSP. The repayment scheme will be at a fixed rate of interest and the repayment term will be agreed with each RSP. This will help RSPs to manage the impact of backdating through reasonable payment options.

[6] The entry level UFB fibre price increases by $1 every year. It will be $38.50 from June 2015, and $42.50 by the end of the regulatory period. The draft determination at page 50 appears to be mistaken when it references that the TSLRIC prices are greater than the entry level fibre price.

69 There has been some suggestion by RSPs that backdating would provide windfall gains to Chorus but, in contrast, that backdating payments to RSPs would be efficient. There is no windfall - Chorus has constrained its business operations and investments as a consequence of benchmarked IPP pricing, as well as suspending dividend payments to shareholders. RSPs are not under the same limitations – retaining investment and pricing flexibility - and their shareholders have benefitted accordingly.

70 The general incentives towards efficient investment for the long term benefit of end-users are the central consideration. This is supported by replacing the benchmarked pricing with the more efficient TSLRIC pricing.

Timetabling

71 We acknowledge the work of the Commission and its advisers in releasing the draft determinations on 2 December 2014 and the significant work this represents.

72 We remain disappointed that the timetable was extended by five months in December 2014 - the third substantial timetable change, with the announcement made only two weeks after the draft determinations were published.

73 The earlier timetable extension to April 2015 has meant that the $34.44 benchmarked pricing has had to be implemented while the FPP processes continue. The latest timetable delay to September 2015 means Chorus will be potentially operating under reduced cash flows for a longer period - an additional five months. A large number of revenue, operating cost and capital expenditure initiatives have now been implemented. Chorus will continue to pursue opportunities to further limit discretionary spending until the situation becomes clearer.

74 We continue to encourage the Commission to share more of a detailed timetable on both its potential opening of a section 30R review of the UBA service description, its scope and how it intends to manage the timetable to complete the pricing review determination including transaction charges and backdating.

Submission

INTRODUCTION

The structure of our submission

75 This submission responds to the following papers published by the Commission in December 2014:

75.1 the draft pricing review determination for Chorus' unbundled copper local loop service dated 2 December 2014;

75.2 the draft pricing review determination for Chorus' unbundled bitstream access service dated 2 December 2014;

75.3 the draft decision on cost of capital for the UCLL and UBA pricing reviews dated 2 December 2014; and

75.4 the process and issues update paper for the UCLL and UBA pricing review determinations dated 19 December 2014.

76 Although we endorse the Commission's approach of preparing separate draft pricing review determinations for each of the UBA and UCLL services, the draft determinations have many issues in common. We have therefore prepared a single submission covering all of the draft determinations and the associated expert reports and consultation papers. Where common issues arise, we have dealt with these together.

77 Our submission is structured into the following Parts:

77.1 **Part One** responds to the issues in the Commission's draft determination for the UCLL and SLU services that are specific to those services;

77.2 **Part Two** responds to the issues in the Commission's draft determination for the UBA services that is specific to that service;

77.3 **Part Three** responds to the Commission's approach to the calculation of an annualised TSLRIC and selection of a TSLRIC based price that are common for the UCLL, SLU and UBA services. This includes the issues of:

(a) WACC;

(b) recognising asymmetries in estimating WACC and the TSLRIC price;

(c) demand;

(d) depreciation; and

(e) tax.

77.4 **Part Four** of our submission responds to the Commission's proposed approach to replacement of the initial price (backdating) in its 19 December 2014 update paper; and

77.5 **Part Five** of our submission provides our comments on the Commission's update to the process for finalising its UCLL and UBA pricing review determinations.

Detailed summary of Chorus' position

78 Our response to the detailed implementation of the Commission's TSLRIC models for the UCLL, SLU and UBA services is summarised in the following tables.

UCLL and SLU

Issue / Input	***Chorus position***
UCLL MEA	Select the MEA with the lowest cost to end-users that is capable of providing the same functionality as the existing UCLL and SLU services, i.e.: • FTTN/Copper; or • FTTH (P2P). Even if the Commission adopts a "core functionality" approach, the core functionality of the Unbundled Copper Local Loop service must include the ability of the service to be unbundled at Layer 1. FWA therefore cannot be in the MEA.
Asset valuation	Select ORC, consistent with the Act's direction to model forward-looking costs and orthodox TSLRIC.
Performance adjustments	No adjustments based on technological performance or consumer preference.
Network footprint	Model a network capable of providing the UCLL and SLU services to all end-users to whom Chorus may be obliged to provide the service under the Act and STD.
Optimisation	Use a scorched node assuming no re-use of Chorus assets and: • ensure that no single element failure can affect more than 5,000 end-users; and • account for equivalent spare capacity in the FTTH network as is assumed in the FTTN/Copper network (11%).
Capital contributions	Include the capital costs of all assets required to provide the UCLL and SLU services to all end-users to whom Chorus may be obliged to provide the services under the Act and the STD.

Issue / Input	***Chorus position***
	If capital costs are excluded outside areas in which Chorus is obliged to maintain network used to serve end-users in December 2001 (the **TSO areas**): • the TSO areas should be corrected to include all end-users' locations existing in December 2001; • include all capital costs of assets required to connect end-users within TSO areas to the core network via an exchange; and • the assumed capital contribution should be implemented as a "one off" payment.
Trenching costs	Adopt the Analysys Mason UCLL model trenching cost data, which are based on a careful assessment of Chorus' actual trenching costs from its UFB and RBI deployment. The Beca analysis is not the best available evidence. If capital costs of servicing end-user premises outside TSO areas are excluded, use an appropriate average cost of trenching for routes included in the model, rather than a national average.
Omitted costs	Include: • installation labour costs for copper cable units included in Chorus' price lists; • overheads charged by service companies for network build in the assumed unit costs; • overhead costs, handling fees and cable hanging/mounting fees for fibre cable costs included in Chorus' price lists; and • missing costs for jointing assets and installation costs for cabinets.
Modelling issues	Revisit calculation of the values of horizontal length in the model to ensure connection with the street cabinet or MDF location. Revisit the mapping of buildings to road sections to ensure buildings are allocated to the closest road section.
Aerial deployment • *Extent*	Real world experience of aerial for the network delivering the services today is 2% of Chorus' actual communal network (excluding drops). A target of 20% for UFB was assumed nationally in the Analysys Mason model. The same constraints that Chorus faces (e.g. access to poles, pole conditions, Council

Issue / Input	***Chorus position***
	constraints) with UFB/RBI rollout would apply to an HEO. A joint telecommunications/electricity lines company deployment is not realistic. Irrespective of the approach taken to modelling aerial distribution, the Commission should: • apply limits to the number and size of fibre cables deployed aerially that reflect realistic resource consent constraints and ensure that critical infrastructure is protected by underground deployment; and • lower the proportion of aerial deployment in urban areas to reflect the greater consenting constraints in those areas compared with rural areas, rather than assuming a uniform deployment of aerial infrastructure.
Aerial deployment • *Costs*	If the proposed joint telecommunications/electricity lines scenario is adopted,: • use the unit costs of poles required to support both telecommunications and electricity infrastructure (not the unit costs of Chorus lead-in poles); • reduce the cost reduction for shared aerial network to less than 100% to account for costs associated with network sharing not directly related to deployment (e.g., pole survey fees and assessment fees) and would be charged to an HEO.
Aerial deployment • *Pole numbers*	Modify the calculation of CCT/FAT and poles on the major side of the road by correcting: • the number of CCT/FAT deployed to account for demand on both major and minor side of the road; and • an issue with the TERA algorithm which calculates the lesser of the number of poles required for distance and to provide CCT/FAT demand, rather than the sum of these. Include poles to enable lead-ins on the minor side of road sections where the served premise is not tall enough to ensure a 5.5m road clearance can be maintained or where there are two or more end-users on that side of the road served by a CCT/FAT.
Lead-ins	Correct modelled distance of lead-ins to account for: • the distance between end-user premises' property

Issue / Input	***Chorus position***
	boundaries and the metallic surface of the road (i.e., footpath, berm and other road reserve width); and • real-world limitations on deployments of the assumed straight-line deployment of lead-ins. An uplift of 15% as used by the Danish regulator (and supported by TERA) is appropriate. Include the costs of ETP, and all wiring to the ETP. The ETP forms part of the UCLL service.
Fixed Wireless Access modelling	FWA should not be included in the MEA, as it is not capable of meeting either the full or core functionality of the UCLL service. If FWA is to be included in the MEA, then: • adopt a throughput level consistent with at least the expected demand for the UBA service in the regulatory period - 250 kbps is not sufficient to meet current demand; • account for coverage limitations of FWA; • correct the assumed cost of spectrum to account for the final price at auction; and • include the costs of providing voice and data services over FWA (including core network functions and aerial equipment deployed at end-user premises).
Operating costs	Use Chorus' actual operating costs as the starting point for its analysis. In addition: • do not apply an LFI adjustment between Chorus' LFI and a new copper network as well as an adjustment for cost differences between legacy copper and new build fibre networks - this double counts efficiency adjustments; • a fibre efficiency adjustment of 50% is not appropriate and is applied to costs which are not technology dependent. Evidence indicates an adjustment of between 15% and 30%. This is consistent with TERA's analysis for the Danish regulator; and • account for the higher opex for aerially deployed network, given that 36% aerial deployment rather than Chorus' actual 2% deployment is assumed.

UBA

Issue / Input	Chorus position
UBA "Additional costs" MEA	MEA for the "additional costs" of providing the UBA service based on Chorus' existing FTTN/Copper network.
Asset valuation	See the UCLL and SLU service comments.
Throughput	Model the "additional costs" so that it is sensitive to throughput. The model should be capable of supporting expected throughput in the regulatory period and the assumptions in the Commission's model are likely to prove inadequate to serve growth through to 2020. The Commission has provided no commentary on what it is seeking to model or achieve. Our submission outlines what we understand is in the modelling for average bandwidth growth. If throughput grows more than is estimated more reviews will be required.
Omitted costs	Include the following omitted costs: • indirect capital costs of commissioning equipment used to provide the UBA service (including design and testing, installation, commissioning, and connection to the network); • incremental costs of larger cabinets to house UBA equipment; and • the costs of a second SFP for each 1 GigE or 10 GigE port connected from each DSLAM.
Capital contributions	Do not exclude costs because of an assumed hypothetical recovery of those costs by the HEO otherwise than through the monthly service charge. If costs excluded based on an assumption that the RBI initiative is a proxy for the deployment strategy of an HEO, no capital costs of DSLAMs should be excluded. These costs were not funded by the RBI initiative.
Cost allocation (bitstream and other services)	Allocate costs using a capacity based approach where sufficient data is available. Where insufficient data on capacity exists (the costs of fibre between DSLAM and cabinet, and cabinet and FDS), allocate

Issue / Input	Chorus position
	costs based on EPMU, using revenue as a proxy for cost.
Cost allocation (regulated and unregulated bitstream services)	Account for any growth in demand for unregulated bitstream services during the regulatory period by undertaking a review of the cost allocation between regulated and unregulated services if and when required.
EUBA variants	Specify differentiated pricing for the EUBA variants using IPP benchmarking.

Common issues

Issue / Input	Chorus position
WACC	Estimate a WACC using the following parameters: • asset beta of 0.50, reflecting the best available evidence of average asset beta for relevant firms over the past 20 years, using the methodology in its Input Methodologies determinations and endorsed by the High Court; • leverage of 0.50, giving greater weight to the gearing of fixed line businesses rather than integrated firms; • risk free rate calculated by reference either to 10-year Government bond yields or longer periods of averaging rather than the one-month average proposed; • a credit rating of BBB- and a debt risk premium which takes account of the premium on bonds issued by Genesis, Mighty River Power and Meridian, to reflect regulatory risk; • compensation for the costs of entering into swap contracts of between 10 and 13 basis points if the debt can be raised domestically and more if some debt is raised overseas; • a term for the cost of debt of 10 years; and • debt issuance costs of at least 0.35% per annum. Have regard to WACC used by other regulators as a reasonableness check. The draft WACC is the lowest in a comparator group of eleven European jurisdictions, the United States and Australia.
Allowance for	Address estimation error in setting the WACC through selection

Issue / Input	Chorus position
asymmetries	of a higher percentile than the mid-point WACC. Include an uplift to the estimate of the TSLRIC price to address residual asymmetric consequences of estimating the TSLRIC price too low that are not accounted for by addressing estimation error in the WACC and adopting the best evidence for other model parameters.
Demand	Use the best available forecast of the HEO's or Chorus' demand, reflecting the existence of competing networks and do not: • include demand that will be served by non-Chorus Local Fibre Companies (**LFCs**) in the regulatory period; or • assume a stable demand during the regulatory period that does not account for growth in demand served by LFCs .
Depreciation	Improve the depreciation profile by using the best evidence of price trends that reflect the expected change in the ORC of each asset, including: • using the labour index for technicians and associates from Statistics New Zealand; • considering more reliable indications for fibre cable forecasts; • taking the long term trends in CGPI including forecasts as an appropriate reference for estimating future trends in ducting and trenching costs, with particular reference to CGPI "civil construction group." Assume a 6 month build period for the assets.
Tax	Include realistic assumptions as to the tax position of the HEO.
Regulatory period	Adopt a regulatory period of at least seven years.
Backdating	Backdate to the date of the relevant IPP determination, to best promote efficient investment. The cost of backdating is proportional to the RSP. Chorus will offer a repayment scheme based on the creditworthiness of the RSP. The repayment scheme will be at a fixed rate of interest and the repayment term will be agreed with each RSP.

PART ONE: UCLL AND SLU SERVICES

79 This Part of our submission responds to the Commission's draft determination on the monthly TSLRIC prices for the UCLL and SLU services, and the consequential price payable for the UCLF service.

The service to be modelled

80 We have provided our detailed views on the pricing review framework to the Commission in our previous submissions.[7]

Selection of MEA

81 The Commission should select as the MEA the lowest cost of either:

81.1 a FTTN/copper network; or

81.2 a (P2P) FTTH network with the costs of "fibre fixes" to enable the functionalities present in the market today via the UCLL service included in the model,[8]

where the cost is measured from end-user to end-user.

82 Even if a "*core functionality*" approach to selection of the MEA is adopted:

82.1 FWA does not qualify for inclusion in the MEA because it is not capable of providing this "core functionality" of the UCLL and SLU service, which requires the ability for the service to be unbundled at Layer 1;[9] and

82.2 GPON cannot be unbundled to dedicate resources on an end-user basis, and therefore a P2P FTTH network should be considered together with a FTTN/copper network to determine the MEA.

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[7] Chorus "Submission in response to the Commerce Commission's Further consultation on issues relating to determining a price for Chorus' UCLL and UBA services under the final pricing principle" (**"Response to further consultation paper"**) (11 April 2014) from [46]; 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" (**"Submission on Commission's framework and modelling approach"**) (6 August 2014) from [29].

[8] Chorus "Submission on Commission's framework and modelling approach" (6 August 2014) at [34.2] and [276]. These fixes for fibre include replacing DSL equipment with optical equivalents, provision of an optical network terminal (**ONT**) (or equivalent), adding an ATA at the customer premises to connect analogue telephone equipment and adding replacement IP telephones, alarms and EFTPOS terminals: Analysys Mason "Response to Commission consultation on regulatory framework and modelling approach for UCLL and UBA" (**"Paper on framework and modelling approach"**) (6 August 2014) from [1.7].

[9] Analysys Mason "Paper on framework and modelling approach" (6 August 2014) from [1.4]; Analysys Mason "Response to submissions on Commission consultation on regulatory framework and modelling approach for UCLL and UBA" (**"Paper on submissions on framework and modelling approach"**) (15 August 2014) at [1.2]. See also Chorus "Submission on Commission's framework and modelling approach" (6 August 2014) from [317]. FWA is also incapable of reliably supporting aspects of the full functionality of the UCLL and SLU services, including support for fax, alarms and EFTPOS terminals: This is reflected in Vodafone's terms and conditions for its Wireless Broadband Service: cl 25 provides that "*The Wireless Broadband and Calling service is not suitable for fax; EFTPOS; monitored alarms; medic alarms; or SKY modems. If you use one of these services you will need to retain a fixed land line*." See http://www.vodafone.co.nz/legal/terms-conditions/wireless-broadband/ .

83 We comment briefly on why we continue to believe that the "*core functionality*" approach departs from the Commission's stated objectives of TSLRIC, as well as our alternative view that the "*core functionality*" of the UCLL and SLU service must include unbundling at Layer 1, in more detail in **Appendix A**.

84 The Commission has selected a FTTH/FWA MEA. However, FWA does not meet either the full functionality of the service or the core functionality of the service.

85 Further, as the Commission has not modelled FTTH with the necessary "fibre fixes" to support full functionality, we consider that the Commission's conclusion that FTTH is the lowest cost technology is not reliable. The Commission objects to taking account of the costs of "fibre fixes" on the basis that it concerns costs that would not be incurred by the HEO, but rather end-users. We disagree. The long term benefit of end-users will be best promoted if the MEA with the lowest cost to end-users is selected. While this may be the same as the lowest cost to the HEO, it will not be where the choice of technology by the HEO imposes external costs on end-users. Analysys Mason has previously reported that this is an orthodox approach to TSLRIC, and has been adopted by the Swedish regulator.

Network footprint

86 The Commission should model a network that is capable of providing the UCLL service to all end-users to whom Chorus may be obliged to provide the service under the terms of the STD. This is essentially the approach set out by the Commission in its December 2013 Process and Issues Paper.[10]

87 In the draft determination, the Commission has revised its approach to determining the network demand footprint so that all copper connections are included in the demand, but capital expenditure involved in connecting premises outside our TSO-derived boundary is excluded. Although the Commission has reached essentially the same conclusion as in its 2013 paper, we believe that analysis of what network an HEO would deploy absent a service obligation is unnecessary. We explain this view further, below, in relation to the capital contributions issue.

Performance Adjustments

88 We continue to support the Commission's decision not to make adjustments to the asset valuation based on technological performance or consumer preference.[11] Adjustments are not consistent with the requirement to model a cost-based price.[12] Their adoption would therefore be inconsistent with the statutory requirements for the pricing review determination.

[10] Commerce Commission "Process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop service in accordance with the Final Pricing Principle" (**"Process and issues paper for UCLL FPP"**) (6 December 2013) at [79].

[11] Commerce Commission "Draft pricing review determination for Chorus' unbundled copper local loop service" (**"Draft determination for UCLL"**) (2 December 2014) at [564].

[12] Analysys Mason "Report for Chorus: Response to Commission" (12 February 2014) at [1.5.1].

Asset valuation

89 We support the use of an ORC methodology for all assets.[13] The forward-looking TSLRIC pricing principle by definition excludes historical network considerations.[14] The use of ORC is consistent with past decisions of the Commission and other jurisdictions on TSLRIC,[15] and incentivises efficient entry.[16]

90 We also support the Commission's rejection of the suggestion that it value 're-usable' assets at historic costs.[17] Such an approach would be a departure from an orthodox and forward-looking TSLRIC.[18]

Optimisation

91 Chorus supports the Commission's approach to optimisation as being consistent with orthodox TSLRIC, including in particular:

91.1 its use of a scorched node approach;[19] and

91.2 its requirement that the MEA be considered for all assets required to deliver the service, and that no re-use of Chorus' existing assets should be permitted.

92 TERA has modelled a modified scorched node approach that is constrained by the existing number of nodes and locations, and follows the road network. Some modifications have been adopted to model the size of exchange buildings and the use of motorways and private roads where it is efficient to do so.[20]

93 We have three concerns with the level of optimisation assumed by the Commission's model:

93.1 **Modelling exceeds network deployment guidelines.** Analysys Mason has identified that in some areas, the Commission's model has over 17 cables containing 312 fibres deployed along a single route.[21]

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[13] Chorus "Submission on UCLL FPP process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop service in accordance with the Final Pricing Principle" (**"Submission on UCLL FPP process and issues paper"**) (14 February 2014) at [65]; Chorus "Cross-submission in response to submissions on the Commerce Commission's Process and Issues paper for determining a TSLRIC price for Chorus' unbundled local loop (UCLL) service in accordance with the Final Pricing Principle" (**"Cross-submission on Process and Issues paper for UCLL FPP"**)(28 February 2014) at [29].

[14] CEG "Non-replicable assets and forward looking cost" (August 2014) at [4] and [8]-[12].

[15] Commerce Commission "Application of a TSLRIC Pricing Methodology – Discussion Paper" (2 July 2002) at page 44 and Commerce Commission "Implementation of TSLRIC Pricing Methodology for Access Determinations under the Telecommunications Act 2001" (20 February 2004) at [142]. Commerce Commission "Implementation of TSLRIC Pricing Methodology for Access Determinations under the Telecommunications Act 2001" (20 February 2004) at [138].

[16] CEG "Non-replicable assets and forward looking cost" (August 2014) at [8].

[17] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [621].

[18] CEG "Non-replicable assets and forward looking cost" (August 2014) at [4] and [8]-[12].

[19] Analysys Mason "Report for Chorus: Response to Commission" (12 February 2014) at [1.8.2];

[20] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [573].

[21] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.14].

This means that over 5,000 end-users may be affected by a single element failure in the HEO's network. This exceeds commonly accepted design guidelines for network deployment, including those used by Chorus in the construction of the UFB network and required by Crown Fibre Holdings Limited in its UFB agreements (which require that no more than 5,000 end-users be affected by a single element failure, or, in a candidate area with fewer than 5,000 users, that no more than 3,000 users be affected);[22]

93.2 **Modelling makes no provision for spare capacity in the fibre model.** In contrast, the FTTN/Copper model allows for 11% spare capacity. Chorus' own design rules make allowances for spare capacity in both its copper and fibre networks. Consistent with this, in the model developed by the Danish regulator in 2014, 25% spare capacity in the distribution network is dimensioned, and 30% spare capacity dimensioned in the feeder network;[23] and

93.3 **Modelling assumes the availability of motorways and private roads for network deployment, without accounting for the additional costs of access**. TERA has adopted a simplified and idealised view of network deployment. In the real-world, the high costs of complying with conditions to obtain access to motorways are often prohibitive for deploying network along these routes. Similarly, difficulties in identifying ownership and complying with conditions imposed on owners means in practice deploying on private roads is a significant challenge, time consuming and costly. These issues would be faced by any HEO deploying network in the real-world, and cause it to incur additional costs.

94 While these complexities, which generally require specific consideration by Chorus' network planners, are difficult to reduce to an algorithmic assessment, the result is that the Commission's model will in this respect be over optimised, and therefore under-estimate the efficient costs of network deployment.

Exclusion of capital costs

Exclusion of costs from TSLRIC to account for "capital contributions"

95 The TSLRIC for the service must take account of the replacement costs of all assets that an HEO would deploy to provide the service Chorus is required to provide. This ensures that the price set by the Commission, however structured, will recover the total cost of providing the service. Accordingly, the Commission should not exclude capital costs from the TSLRIC model on the basis that those costs will be notionally recovered through a hypothetical capital charge which does not actually form part of the price for the service.

96 As the Commission has correctly recognised, while the Act's requirement that the Commission set a geographically averaged price means that TSLRIC cannot act as an efficient benchmark for every line of the entire network, TSLRIC can be

[22] Network Infrastructure Project Agreement (24 May 2011), Schedule 3, Annex 2. See Requirement 25.

[23] TERA "Specification document" (August 2014) at table 3, available at https://erhvervsstyrelsen.dk/sites/default/files/media/endelig-modeldokumentation.pdf.

expected to provide for the upkeep of the network and equipment and any required expansion across Chorus' actual network.[24] This is an essential objective of the TSLRIC exercise to achieve the section 18 purpose.

97 If capital costs are excluded from the Commission's model, this will result in an under-estimate of the costs required to maintain the existing network footprint. This is inconsistent with the objective that the TSLRIC cost provide for the upkeep of the network (including ongoing renewal of network assets) and equipment and any required expansion across the network.

98 The Commission proposes to exclude significant capital costs from the network modelled on the basis that a HEO would receive a capital contribution covering the costs of the assets used to serve certain, primarily rural, end-users.[25] The Commission's analysis is premised on an assumption that, in the absence of a universal service obligation, an HEO would have a choice whether to serve demand and would only deploy its network to serve remote demand if it received a capital contribution.[26] The Commission also implicitly assumes that end-users would agree to a 100% capital contribution to fund network deployment.

99 The Commission's analysis overlooks that Chorus has a separate obligation under section 30S of the Act and the terms of the STD to provide the service:

99.1 Chorus is required by section 30S of the Act to supply the designated access service, in this case, UCLL and SLU, to any RSP on request on the terms of the STD;

99.2 the relevant service is described in Schedule 1 to the Act as "*access to, and interconnection with, Chorus' copper local loop network*"; and

99.3 accordingly, Chorus is required to provide the UCLL service in respect of any end-user premises which has an MPF connected to an ETP at the premises at the time of the request by an RSP (UCLL STD cl 4 and Schedule 1, cl 1.2).

100 In other words, at the start of the regulatory period Chorus has an obligation to maintain all existing connections where the service is currently taken by an RSP, and an obligation to provide the service in respect of any end-user connected to its copper network.

101 The statutory question is therefore what the TSLRIC costs of providing the service connecting those end-users efficiently are. This is the question that the HEO concept is required to answer. There is therefore no relevant distinction between the approach to be taken to TSLRIC under the Act and the orthodox approach to TSLRIC in other jurisdictions which model the full cost of the connection base at the date of the determination.

[24] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [146].

[25] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [267]-[270].

[26] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [270].

102 While the HEO concept is a tool to establish the TSLIRIC price, it cannot substitute for the statutory test. The Commission's analysis divorces the HEO concept from the task that the Commission is required to undertake: to determine the TSLRIC cost of the service that Chorus must provide under the Act. It is inconsistent with that statutory task, and artificial, to assume that the HEO has a choice whether to provide the service in respect of end-users which Chorus is obliged to provide the service in respect of.[27]

103 Put another way, the Commission's approach conflates the orthodox TSLRIC question of asking *how an HEO would build a network* to efficiently serve the end-users it must provide the regulated service in respect of with the separate question of *how an HEO would recover the cost* of doing so. In the real-world, a company could seek to recover its costs through a mixture of pricing and upfront contributions from RSPs and end-users.[28] However, the FPP for UCLL specifies that TSLRIC of the service is to be recovered through the UCLL price, not only partly through the UCLL price.

104 The Commission's approach is also inconsistent with its stated objective of a predictable application of TSLRIC. There is no objective criterion to analyse – and therefore predict – when a HEO might require a capital contribution. What network a HEO might require a capital contribution for (assuming it is able to insist on one) will depend on the monthly rental price for the service and whether it is able to geographically de-average prices. Therefore, there is no way of determining the circumstances in which a HEO would seek a capital contribution independently from the monthly rental price which the capital contribution is being used to determine.[29]

105 This means that the selection of what capital costs are to be excluded must inevitably be arbitrary. Such an arbitrary choice is inconsistent with predictable regulation, and creates uncertainty which will not promote efficient investment.

Implementation of the TSO areas as a proxy for where capital contributions would be received

106 If, contrary to our view, capital costs are excluded from the TSLRIC of deploying the network footprint, then TERA's implementation of the Commission's TSO boundary approach can and should be improved.

107 The Commission has adopted an initial investment boundary around clusters of premises based on the areas in which the 2001 TSO obligation applies (the **TSO areas**). It has assumed that an HEO would connect additional premises within

[27] This artificiality is illustrated by the fact that the Commission must also assume that the end-user will pay the demanded capital contribution *in every case*.

[28] The Commission has noted that, for new subdivisions wishing to have Chorus extend its network as well as certain high-cost new connections, Chorus has recently moved to require a capital contribution. That development was in direct reaction to the Commission's IPP determinations for UCLL and UBA, which set a monthly charge that did not enable Chorus to recover its costs of extending its network. If the FPP price enables Chorus to recover the costs of maintaining and extending its network, then Chorus will reverse this policy. And, if such FPP pricing was backdated, then Chorus would be willing to refund any relevant contribution relating to the backdated period.

[29] See for example Commerce Commission "Determination for TSO Instrument for Local Residential Service for period between 20 December 2001 and 30 June 2002" (17 December 2003) from [43].

these boundaries to its network, but that premises outside the TSO areas would only likely to be connected where a capital contribution was proved by the end-user, such that only operating costs are incurred by the HEO.

108 The Commission has indicated that, on its approach, the capital costs of 6.4% of address points and 47.5% of road network length have been excluded from its modelled costs.[30] However, it appears from our analysis that the Commission model in fact excludes 52.5% of road network as falling outside TSO areas, not the 47.5% stated in the Commission's draft determination. This equates to approximately 70,000 km of road sections.

109 Chorus has recovered data from a model created by Telecom in 2001 to depict its network.[31] That model records that in 2001, Telecom deployed approximately [**RI:**] km of copper cable to serve TSO end-users. Assuming a ratio of cable length to route length of [**RI:**] on average,[32] the estimated route length of the copper network was [**RI:**] in 2001. This compares with **[RI:**] km in 2014,[33] an increase of approximately [**RI:**] km of route length. This is the maximum distance that is appropriately outside TSO areas, but is a fraction of the excluded road sections.

110 It appears this issue may arise because of inaccurate geo-coding of end-user premises connected in December 2001, and because the TERA has excluded assets required to connect discrete TSO areas to Chorus' network. Figure 6, below, again shows end-user locations that existed in 2001 in the Canterbury region (shown in purple), compared with the Commission's TSO polygons (shown in white). As can be seen, and is discussed in more detail in the next section of the submission, the Commission has derived a series of disconnected polygon "islands" which appear to be tightly defined around some, but not all, premises served in 2001.

[30] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [814].

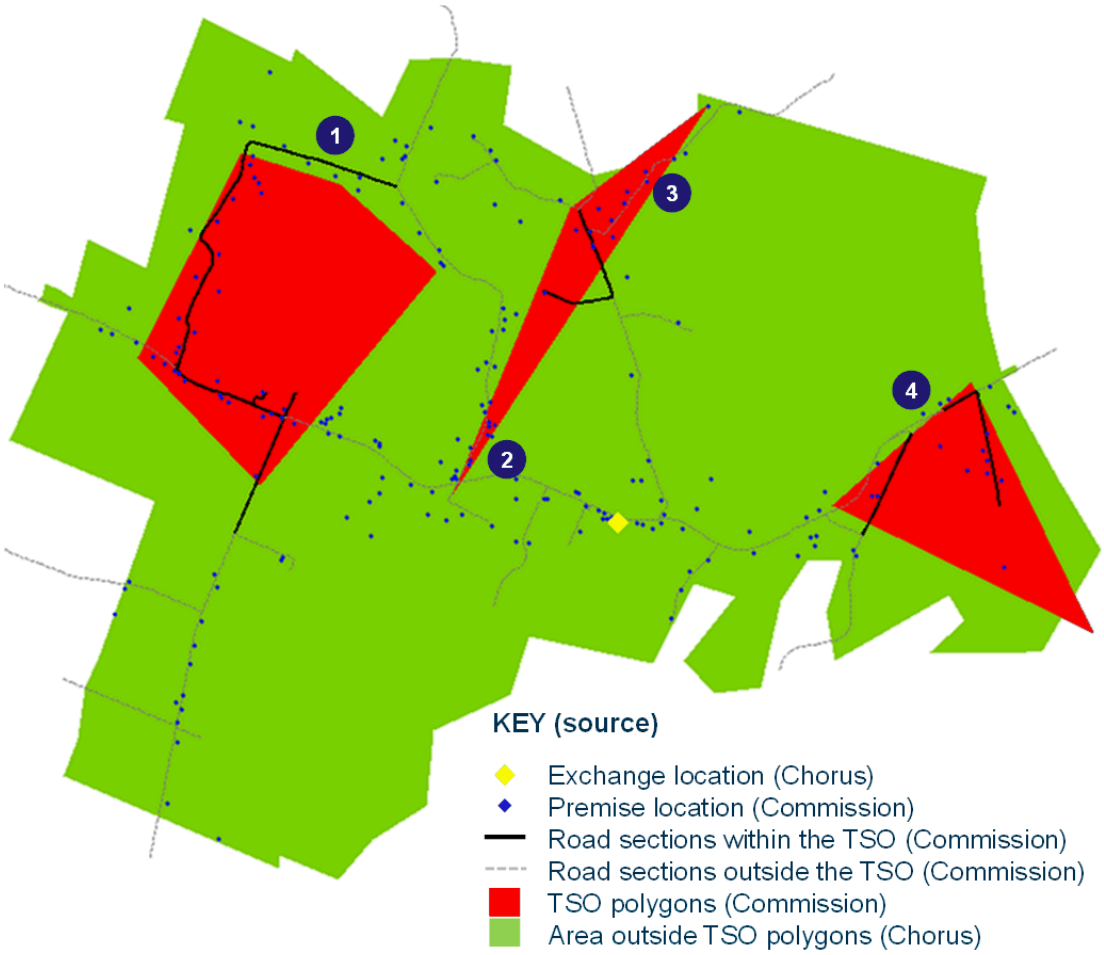
[31] AMFM data was sourced from AMFM before the system was decommissioned around 2001. The file was used for a Telecom TSO model and supplied to the Commission in mid-2002.

[32] This ratio is derived from comparing the current cable length in Chorus' network to the route length recorded in Chorus' NetMap database (as at June 2014 and 2007).

[33] Based on Chorus Netmap data as at June 2014.

Figure 6: Canterbury TSO 2001 end-user connections not included in the Commissions TSO area

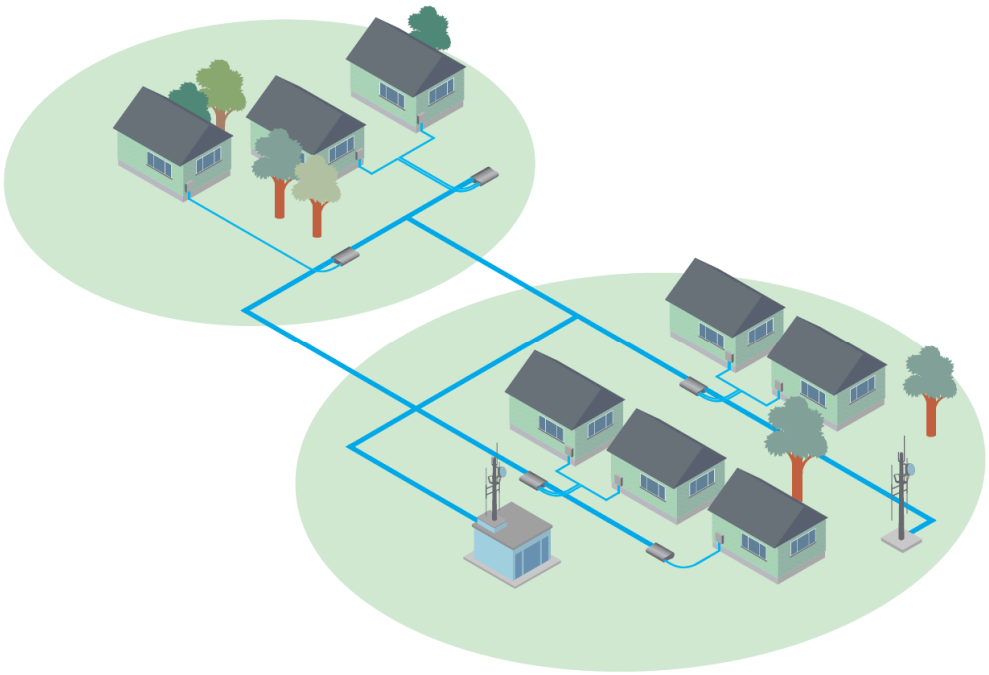
Figure 7: Illustration of the RNU exchange location lying outside the TSO-derived boundary



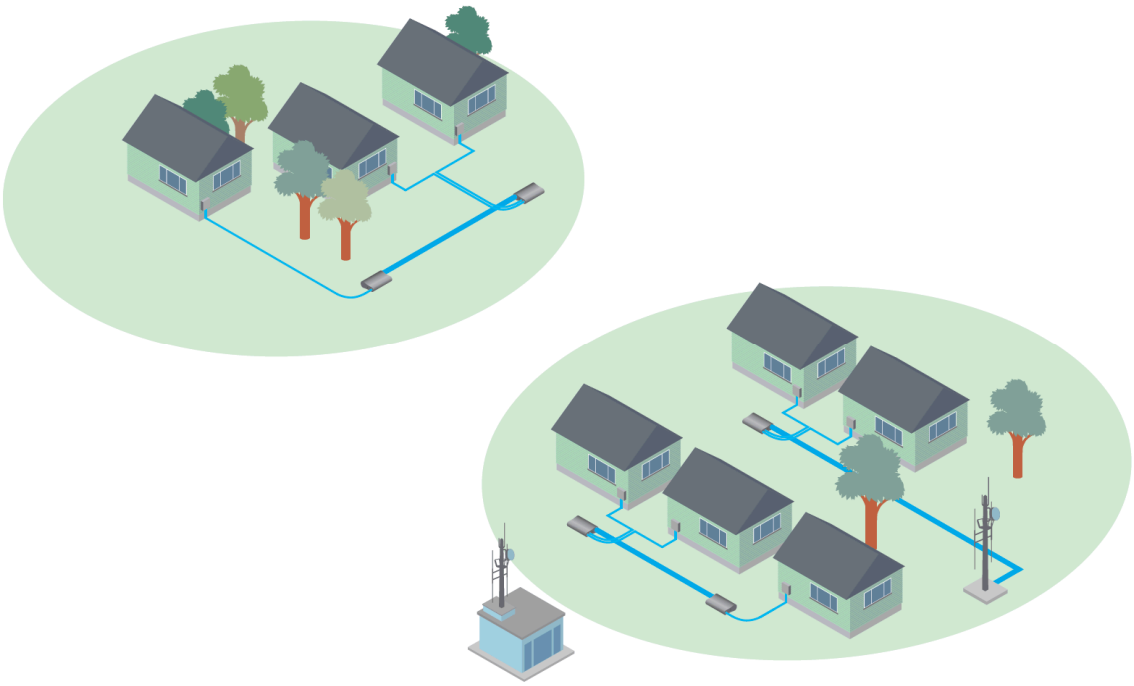
Source: Commission and Chorus data, 2015

Figure 8: TSO "Islands". Refer to paragraph 110.

TSO 2001 end-user premises connected to an exchange



TSO 2001 end-user premises after TERA applied polygons: costs of network required to serve 2001 end-user premises excluded



111 In addition, in many cases the TSO areas identified by the Commission are not connected to an exchange. This means that network required to serve those areas – i.e., the routes taking lines back to an MDF located in an exchange - is being wrongly excluded by the Commission model. The example of the RNU exchange is shown in Figure 7, above.[34] The effect of this exclusion on the modelled network is illustrated in Figure 8, above.

112 Assuming that the network follows the roads (as the Commission's model does) the only way for network in the TSO areas (i.e., within the red "islands") to be connected to the exchange location is to use routes the costs of which are currently excluded from the Commission's model (because they fall within the green "sea" of regions outside the TSO areas).

113 The implementation of Commission's approach should therefore be corrected by:

113.1 ensuring that the TSO areas derived by the Commission are accurate and encompass all 2001 end-user premises. Chorus has gone back to the end-user data 2001 used for the Commission's TSO determinations, and updated this to reflect modern geo-coding information for end-user premises served in December 2001;

113.2 ensuring that capital costs associated with route lengths and assets required to serve premises within the TSO areas derived by the Commission are not being excluded by the Commission's methodology; and

113.3 treating any assumed capital contributions as a one-off payment for network deployment received by Chorus for the first deployment of the relevant assets, but not any subsequent replacement of the asset.

114 As a cross-check, the Commission should also model the actual route length required to serve these end-users and compare it with the route length required to serve all demand in 2014. Logically, the route length to be excluded as not required to serve demand in the TSO areas should be less than the difference between the route lengths required to serve specific end-users in 2001 and 2014.

115 We describe these corrections in more detail in **Appendix B**.

Deployment and build costs

116 We have identified a number of areas where we consider that the Commission's model overlooks legal or practical constraints on - and costs of - network deployment in New Zealand which the HEO would inevitably encounter. Our detailed submissions on these issues are grouped under the following topics:

116.1 trenching and reinstatement costs;

116.2 omission of service company overheads and certain other costs of network deployment;

[34] See Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.1].

116.3 modelling algorithm issues;

116.4 the approach to modelling aerial deployment;

116.5 assumptions around lead-in deployment; and

116.6 assumptions for FWA deployment.

117 The Commission should be careful to ensure that the assumptions based on a consideration of the HEO concept do not lead it to assume away actual costs and legal and practical constraints on network deployment simply because the HEO analysis involves a "hypothetical" entrant. Such unrealistic assumptions will lead to an underestimate of the true TSLRIC of providing the service.

Trenching and reinstatement costs

118 The Commission's model includes several omission and oversights in its modelling of the HEO's likely trenching costs.

119 We commissioned Aurecon, an expert engineering consultancy, to comment on the methodology of Beca's report. Aurecon's report and credentials statement is provided with this submission.[35] We also have significant internal expertise in civil contracting costs from the ongoing UFB and RBIbuild.

120 We identified the following key issues with the Commission's approach:

120.1 **Chorus' UFB build cost data was not available to Beca**,[36] which significantly diminishes the likely accuracy of their estimation. Chorus provided detailed nationwide cost information in its UCLL model on 1 December 2014. Beca did not have access to this data and instead utilised indicative quotes based on estimates from a limited number of contractors;

120.2 **Beca's analysis is based on indicative quotes, not actual market rates**. A number of larger firms were unwilling to provide any rates to Beca at all.[37] Nor does Beca's report appropriately reflect regional variations in trenching costs, because it had a very limited data set which did not cover all New Zealand regions;

120.3 **30 mm asphalt reinstatement is often insufficient**. Beca has only accounted for asphalt reinstatement. In practice, the HEO would be obliged to comply with utility operators' reinstatement conditions imposed under the National Code of Practice for Utility Operators' Access to Transport Corridors (**Code**) and/or any reinstatement conditions imposed by local councils in their capacity as asset owners. In Chorus'

[35] Aurecon "Review of FPP Corridor Cost Analysis" (10 February 2015).

[36] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014) at page 3 *("Beca has produced this report as an independent consultant without any technical or costing input from the Commission…")*.

[37] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014) at page 11.

experience, these conditions commonly include half or full width footpath reinstatement and/or like-for-like replacement, each of which drives significant costs (particularly in areas with concrete and/or speciality paving, as is common in many cities and towns).

121 The Commission should adopt Chorus' build costs data included in the Analysys Mason model provided to the Commission as the best available evidence of trenching and reinstatement costs. That data is based on actual market prices for trenching in a national network build in current market conditions, and is far superior to the indicative all-in cost estimates which Beca obtained from (relatively few) contracting firms. The data has been extrapolated to provide nationwide trenching rates using a sophisticated methodology that is senstivie to cost drivers in different ESAs.

122 These issues are discussed in more detail in **Appendix C**.

Omitted and under-estimated costs

Service company overhead costs

123 The Commission has omitted service company overheads from its modelled costs of the HEO's network build.

124 In Chorus' experience, it is commercially infeasible to contract directly with civil works firms for each job, given the number of staff and specialist expertise required in a network build. Chorus has retained multiple service providers, including Visionstream and Downer, to undertake civil UFB and RBI works on its behalf: those service companies are then responsible for all aspects of build delivery, including engaging and managing all subcontractors on particular jobs. If Chorus did not engage service companies to be responsible for these aspects of build delivery, then equivalent costs would be borne by Chorus as operating expenses.

125 **[CI:**

126

]

127 While the HEO would have similar size and leverage to Chorus, and could therefore achieve similar rates, there is no basis for suggesting that an HEO would be able to achieve any better outcome.

128 We set out further detail on service company overheads calculation and typical quantum in **Appendix D.**

Costs related to ETP

129 The Commission's draft determination records that "*The ETP is however not part of the access network as its cost is recovered through a different service.*"[38] The Commission is not correct to assume that the ETP costs are recovered as a component of a different service. Rather, Chorus is presently obliged to repair or replace faults up to and including the ETP as part of its provision of the UCLL service.[39]

130 The ETP cost must therefore be included in the price for the UCLL service. All wiring before the ETP must also be included. For some MDUs, this requires Chorus to install cable to the building distribution frame (where the ETP is at the frame).[40] The Commission should include an allowance of the cable to the building frame in the modelled access network build cost.

131 ETP costs are discussed in more detail in **Appendix D**.

Traffic management, planning

132 The Commission has under-estimated various build costs, including traffic management, planning, mana whenua consultation and liaison,[41] health and safety compliance, and arborist costs. Again, each of these costs can be a significant factor in the overall trenching costs, and each is omitted or significantly understated in the Commission's model. Some of these issues are illustrated in Figure 9, below.

133 These issues are discussed in more detail in **Appendix D**.

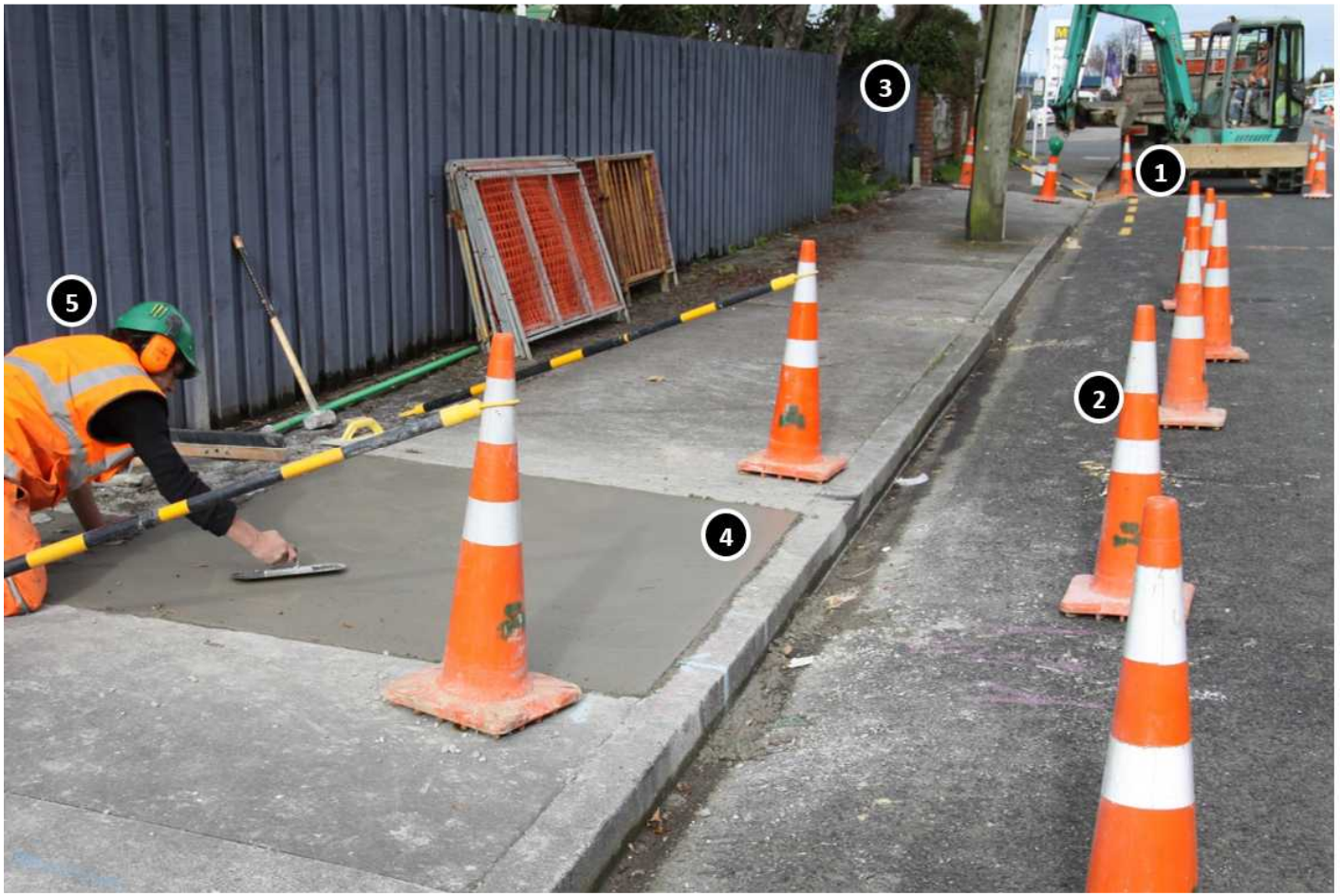
[38] TERA "Model reference paper" (November 2014), section 2.2.1.

[39] Standard Terms Determination for Chorus' Unbundled Copper Local Loop Network Service (7 November 2007 as updated as at 30 November 2011), Schedule 1, cls 2.5 and 3.2 "*The MPF extends from the External Termination Point (ETP)3 at an End User's site, through Chorus' Local Loop Network,4 to the HDP block on the MDF in a Exchange.*"… "*The MPF Service excludes premises wiring. The Access Seeker or the End User will be responsible for customer premises equipment (CPE) and wiring at the End User's site beyond the ETP*."

[40] UBA Service Description, cl 3.22; UCLL Service Description, cl 3.1 and cl 2.8: the *External Termination Point* (ETP) definition for the UCLL service is "the external termination point for telecommunications services at an End-user's premises or, where there is no termination point external to the premises, either the first jack on the premises wiring or, **where appropriate, the building distribution frame**" (cl 2.5, footnote).

[41] Presently, only Auckland Council requires mana whenua consultation and liaison under its unitary plan. However, Wellington is moving to a similar approach and so an HEO would likely face those costs in Wellington (and potentially other regions).

Figure 9: Summary of deployment issues



1. Type of dig depends on environmental factors. Refer paragraph 412
2. Traffic management costs required. Refer paragraph 132
3. Arborist costs required during deployment. Refer paragraph 132
4. Like for like reinstatement. Refer paragraph 120.3
5. Service company overhead costs required. Refer paragraph 124

Modelling algorithm issues

134 Analysys Mason has identified two issues with the implementation of the Commission's model that require correction:

134.1 **horizontal lengths calculated are not always measured to the end of the road segment connected to the cabinet/MDF**. In order to correctly calculate the trench or aerial route distance from each end-user building to the MDF or cabinet serving that end-user, it is necessary to identify the direction which the copper pair or fibre must travel down the road to be connected to the cabinet or exchange. Analysys Mason have identified that the Commission's model does not appear to calculate horizontal lengths from the correct end of the road segment in all cases;[42]

134.2 **mapping of buildings to road segments**. In order to correctly calculate the costs of serving an end-user, the end-user's building must be correctly mapped to a road. Analysys Mason has identified a number of instances where this is not the case.[43]

135 Analysys Mason has not, in the time available, been able to calculate whether the effect of these issues is to result in an over- or under-estimate of the TSLRIC cost. However, given the importance of accuracy in the Commission's modelling, these issues should be corrected.[44]

136 Further details on these issues are provided in the Analysys Mason report provided with this submission.

Aerial network deployment

137 Our position on aerial network deployment is that:

137.1 the Commission's approach to modelling aerial deployment – the HEO/lines company shared deployment envisaged by the Commission is a significant abstraction from the reality of New Zealand network deployments. The "joint build" posited by the Commission would never occur in practice, and risks overstating the feasibility of aerial deployment and understating costs; and

137.2 even under the Commission's shared build model, many assumptions are made around consenting (e.g. for new poles and new aerial road crossings) and in relation to pole specification and pole placement which, if adopted, would not deliver a workable network or one which reflects New Zealand legal requirements and practical conditions.

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[42] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.4].

[43] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.5].

[44] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.4]: *"We do not think that it is safe to justify this inaccuracy on the grounds that it will lead to a mix of over- and under-estimates which will "cancel out on average"; this would depend on the choice of ends being truly random, which may well not be the case."*

Commission approach to modelling aerial deployment

138 In the real-world, HEO aerial deployment would involve a mixture of its own build (primarily of lead-ins) and obtaining access to the existing distribution networks of electricity lines companies under commercial agreements, as is Chorus' experience for UFB deployment. Both build and buy options have significant complexities which serve to limit the feasibility of aerial deployment in many locations.

139 The Commission's draft determination of the HEO's aerial deployment assumes an idealised scenario of aerial deployment in which the HEO telecommunications access provider and electricity lines companies share the costs of joint deployment of an aerial distribution and lead-in network. In this "joint build" exercise the HEO (and lines companies) obtain the benefit of Chorus' existing consents for aerial infrastructure.

140 The commercial reality in New Zealand is that all lines companies have existing pole networks and so would never need to engage in an entirely new build. Instead, lines companies can and do charge commercial tariffs for pole access.[45] Obtaining this access, and the complex conditions under which existing pole networks can be used for telecommunications networks, in practice, limit use of lines companies' networks.

141 We have concerns about such a significant abstraction from the reality of network deployment in New Zealand. Such an approach risks overstating the feasibility of aerial deployment. The Commission should therefore adopt a cautious approach to what a realistic proportion of aerial deployment is on its modelled scenario.

142 In particular, the Commission should ensure that its model reflects the commercial reality that the HEO would not deploy aerially in all places where poles are available and aerial deployment is legally permitted. Rather, the HEO would assess on each route whether underground deployment is cheaper than aerial. For example, significant pole replacement (if required) together with payment of commercial tariffs for access may render aerial deployment more costly than underground.

143 Similarly, in some rural areas a mole plough can be used – again, this may mean that aerial might be more costly than underground deployment. Overall, the HEO would not adopt an "aerial at any cost" decision process but would consider the relative costs of aerial versus undergrounding.

144 We discuss these issues in more detail in **Appendix E**.

Resource consent constraints

145 Even under its "joint build" approach, the Commission has not adequately accounted for the RMA requirements associated with aerial deployment. These consenting issues are relevant to many parameters of the aerial deployment model, including pole location and lead-ins.

[45] Access protections in the Telecommunications Act 2001 applicable to pre-existing assets (see section 155) do not apply to newly deployed fibre networks.

146 Our expert advisors, Incite, reviewed the Commission's resource consent assumptions. Their report is provided with this submission. Incite's key conclusions are:

146.1 Chorus' existing consents for aerial deployment do not cover all areas. The HEO and lines companies would need to apply for consents in at least some towns and regions;

146.2 in the areas for which Chorus does have consent, it was necessary for Chorus to develop an aerial deployment methodology that minimised visual effects to the position where councils were comfortable to grant resource consents on a non-notified basis. This requires a Council to conclude that any visual effects are "less than minor". Under that standard methodology (which forms the primary basis for all of Chorus' existing aerial deployment consents) there are key deployment rules which Chorus must follow. These relevantly include:

(a) no new road crossings can be created – road crossings must follow existing electricity or telecommunications lines across the road;

(b) existing Chorus service poles may be replaced with a new pole within 2 m and up to 1 m higher, but no new poles may be installed;

(c) customer lead-in lines up a right-of-way or linking between poles in the road reserve are to follow the existing copper network in the same envelope (i.e., new spans cannot be linked where there is not copper);

(d) the final customer connection span from the last pole to the premises must either replace an existing copper line with a new hybrid copper/fibre line, or if no copper line exists then follow an existing electricity connection, but not create a completely new overhead connection where one does not exist. If there is existing Chorus underground duct space available this must always be used in the first instance.

Where the above requirements cannot be met, the line must be placed underground or a specific resource consent sought.

147 The HEO, even if it somehow obtained the benefit of Chorus' existing consents, would continue to be subject to these key deployment rules. These issues are discussed in more detail in **Appendix E**.

148 To the extent that the Commission has relied on assumptions about what Chorus' resource consents would permit in reaching its conclusions on the likely proportion of aerial deployment, it should revisit those conclusions to reflect the restrictive nature of Chorus' existing consents as explained by Incite.

149 The Commission should also ensure that its modelling assumptions for pole location and lead-ins accurately reflect RMA constraints on those types of aerial deployment, as discussed below.

Costs omitted or understated

150 Even on the Commission's preferred modelling approach, the Commission's draft determination of the costs of an HEO deploying a nationwide fixed line network omits or materially understates several important categories of costs that would be incurred in the case of the joint deployment contemplated by the Commission. Those omissions include:

150.1 **the costs of the taller and stronger poles required to carry electricity lines and for road clearance**. Without such higher-specification poles, the HEO could not undertake the shared deployment of network with lines companies contemplated by the Commission's model. The network would also fail to meet minimum height clearance requirements for road crossings of 5.5 m for telecommunications lines and 6.5 m or 7 m for certain electricity lines.[46] Beca's report estimates that suitable poles cost around $5,000 each, which is broadly in line with Chorus' UFB experience (our section 98 information for pole costs only related to lead-in poles, which are not suitable for electricity distribution lines);

150.2 **cable handling and hanging costs**, each of which is inevitably incurred in aerial deployment when mounting cables on poles, and which the Commission appears to have omitted from its build cost model;[47]

150.3 **consenting and planning costs associated with aerial deployment**. Even if the HEO and lines companies obtained the benefit of Chorus' consents (an assumption with which we disagree), it would incur:

(a) planning costs, in identifying where aerial deployment is possible;

(b) ongoing costs in ensuring compliance with consents (including mana whenua liaison);

(c) notifying certain activities or seeking specific consents where required; and

150.4 **arborist costs**, to ensure that trees and vegetation do not obstruct aerial deployment, or where trenching around large or protected trees to ensure that underground works do not disturb the root ball of a tree is required. These appear to have been omitted from the Commission's model.

[46] Telecommunications Act 2001, section 149. The New Zealand *Electrical Code of Practice for Electrical Safe Distance* (NZECP 34:2001) requires a minimum safe distance of conductors from the ground of 5.5m across or along roads or driveways for circuits not exceeding 1 kV, and 6.5m for circuits between 1kV and 33kV. Some 11kv to 33kv circuits require 7m clearance.

[47] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [3.1].

Pole location and quantity assumptions

151 The Commission must also ensure that its assumptions about aerial deployment (for example, pole span, pole placement, and lead-in construction) are appropriate for New Zealand conditions.

152 Chorus' experience is that the average achievable pole span in urban areas is 40 m, reflecting an average pre-premise street frontage of 20 m and lead-in poles which serve, on average, two premises. The Commission's assumptions in relation to pole deployment appear to effectively result in a 65 m aerial pole span in most urban areas. In practice, Chorus and other network companies are unable to achieve such limited pole deployment. This suggests that the Commission's modelling assumptions are not realistically capturing the legal and physical constraints on aerial deployment in New Zealand.

153 Analysys Mason has identified the following particular issues in relation to deployment of poles and CCT/FAT on the major side of the road which require correction in the Commission's model:[48]

153.1 **when deploying CCT/FAT only on one side of the road, the number of CCT/FAT deployed currently does not account for total demand on both major and minor side of the road**. The Commission's model currently counts CCT/FAT for the higher of demand on the major and minor sides of the road respectively. This will result in an underestimation of CCT/FAT required to be deployed in most circumstances where there is demand on both sides; and

153.2 **the number of poles deployed on the major side of the road should account for both the number of poles required to cover the route distance and to provide CCT/FAT demand**. The Commission's model currently counts poles for whichever of these two factors individually produce the highest number of poles deployed. This will result in an underestimation of the poles required to be deployed, as in reality both effects need to be taken into account: the poles deployed to carry CCT/FAT will not be in the right locations to also provide the route distance.

154 In addition, the Commission's model makes no allowance for lead-in poles to be deployed on the minor side of the road. This is unrealistic. Poles are needed on the minor side of the road to meet minimum road crossing heights and realistic consent requirements (i.e., to avoid each premise on the minor side of the road having its own lead-in strung across the road). In particular:

154.1 the minimum road crossing height requirement is 5.5 m (as it is for all public roads, or 6.5 m / 7 m for some types of electricity lines). The Commission's model includes no poles on the minor side of the road. However, line sag means that the lead-in is likely to infringe the minimum road clearance rules without an additional pole on the minor

[48] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.6] – [2.8].

side of the section to support a lead-in to premises on that side (unless the building being served is greater than 5.5 m tall); and

154.2 in many cases additional poles on the minor side are required to serve rear sections located down right of ways or private roads.

155 Taking these matters into account, Chorus in practice serves approximately two premises per lead-in pole. A similar deployment strategy would be taken by the HEO and electricity lines companies. The Commission's model underestimates the number of lead-in poles required by a significant margin.

156 These issues are discussed in more detail in the Analysys Mason report accompanying this submission.

Lead-in assumptions

157 The Commission's draft determination and Commission model parameters also do not reflect practical constraints on lead-in deployment in New Zealand. In particular, as described in the Analysys Mason report:[49]

157.1 **the Commission's model has not included the distance in between property boundaries and the road surface in their model**. Effectively, this distance comprises the area of the road reserve that is not the physical road itself (usually consisting of the footpath and verge/berm). The portion of the network between the edge of the metalled surface of the road and the edge of each property boundary is missing; and

157.2 **the Commission's model assumes that a lead-in may be deployed in a straight line between the end-user building and pole**. In the real-world, physical obstacles (such as buildings, trees) and legal requirements (i.e. to avoid neighbouring properties) mean that a lead-in which is longer than the straight line distance to a property is often required. Lead-ins often follow an angled or jointed route rather than a straight line across intervening properties.

158 In its 2014 model for the Danish regulator, TERA made an allowance of an additional 20% of lead-in length to account for these two features.[50] A similar adjustment is required in New Zealand.

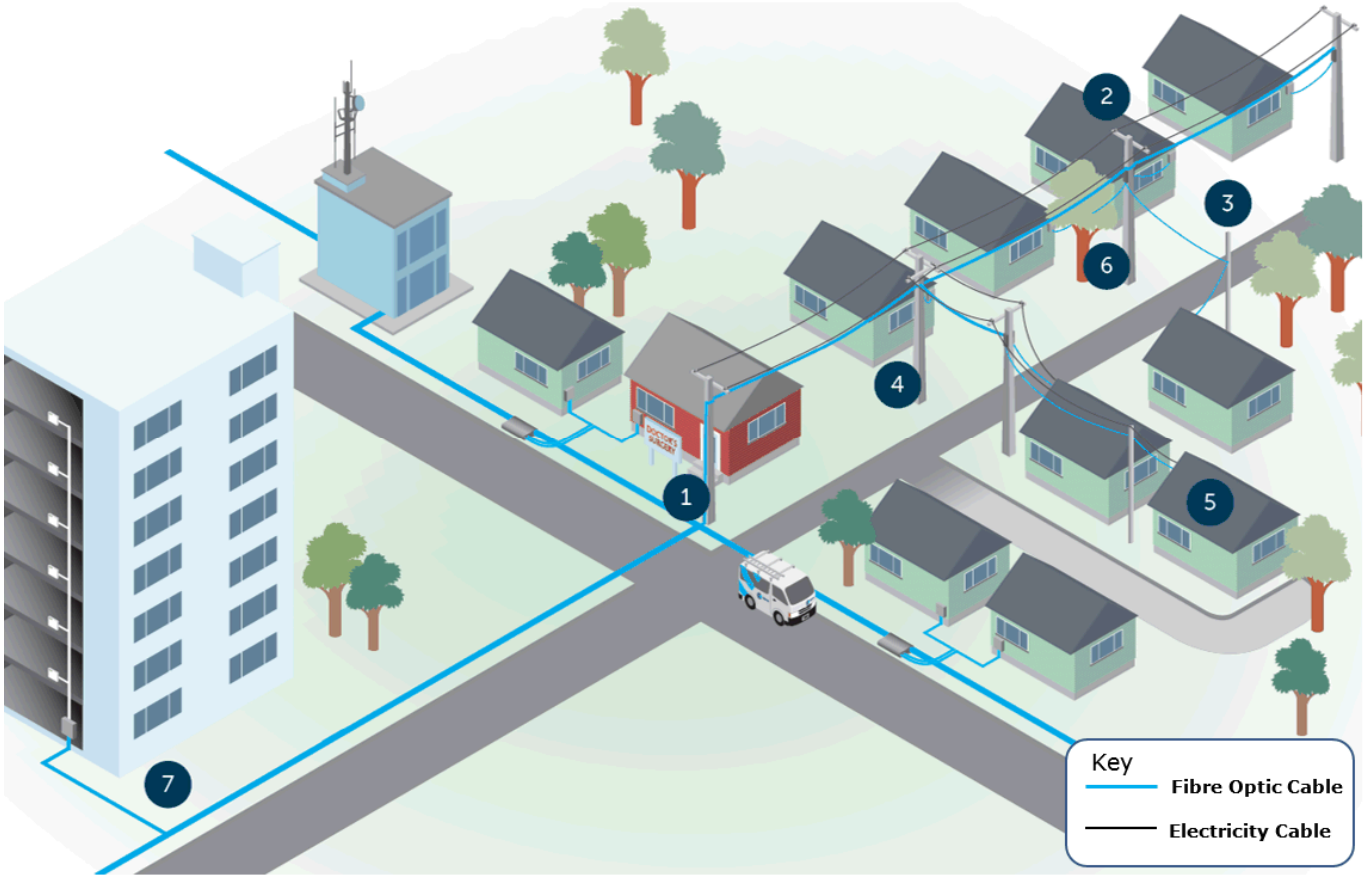
159 These issues are discussed in more detail in **Appendix E** and the Analysys Mason report accompanying this submission.

160 A summary of the issues with aerial deployment and lead-ins in the Commission's model is included in Figure 10, below.

[49] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.3].

[50] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.3].

Figure 10: Summary of aerial, lead-in, ROW and MDU issues



1. Pole specifications are not compatible for pole sharing. Refer paragraph 150.1
2. On average a lead-in pole serves 2 houses. Refer paragraph 155
3. TERA's pole/cable height does not meet the minimum road clearance 5.5m. Refer paragraph 154.1
4. TERA's 65m span is too wide for urban areas. Refer paragraph 152
5. Lead-ins require extra poles to serve many rear sections. Refer paragraph 154.2
6. Arborist costs required for pole maintenance. Refer paragraph 150.4
7. Costs for wiring to plant room in an apartment need to be included. Refer paragraph 130

FWA deployment

161 If, contrary to our view, the Commission considers a FWA MEA, then the Commission's FWA model must be adapted to take into account the functionality of the regulated UCLL and UBA services being modelled, and the real-world considerations and their associated costs in providing that service. Given capacity, coverage and cost (both to the HEO and end-users) issues with the way in which TERA has implemented its FWA model, the Commission cannot conclude that FWA will be cheaper than FTTH, whether within or outside RBI coverage areas.

162 The reality of network deployment in New Zealand is that there is no widespread FWA service in the market today despite the presence of multiple mobile networks. This no doubt reflects the limitations on the service, not only in relation to its lack of core functionality for the UCLL and SLU services, but also the limitations on the technology to provide an UBA equivalent service. Any assumption of widespread use would therefore directly contradict the real-world market experience.

163 The Commission has not modelled FWA deployment in the same manner as the FTTH network. Instead, the Commission has used the Vodafone RBI deployment as a proxy for the deployment that would be implemented by an HEO. But the Vodafone RBI deployment was developed to deliver particular services, which are not wholly comparable with the UCLL and UBA services. Adjustments are therefore required in order to ensure comparability and a real-world cost.

164 In particular, we have identified the following issues with the Commission's model:[51]

164.1 **the UCLL MEA selected must be capable of serving at least the demand for the UBA service, including expected throughput**. If the MEA selected for the UCLL service is not capable of supporting a broadband service at expected levels of demand, it will not meet the needs of RSPs that use UCLL. The Commission has deployed FWA with a throughput allowance of 250 kbps. This allowance is not capable of meeting current or projected future broadband demand, and should be increased to at least meet expected growth of throughput. Indeed, because the UCLL service is unconstrained, it would be appropriate to allow for greater throughput;

164.2 **the assumption that the 67 most expensive premises within each base station's potential coverage area may be served by FWA does not reflect real-world coverage constraints**. This is an overly optimistic assumption given real-world coverage constraints. Given known radio propagation issues, the Commission cannot assume, absent detailed terrain studies, that a RBI base station would reach all 67 most expensive premises in each zone. The Commission's model should either allow for an appropriate percentage of failed connections (which would

[51] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [6].

then use FTTH) or for the costs of addressing failed connections by installing additional equipment; and

164.3 **it does not include the best available evidence of the cost of acquiring spectrum**, **nor the full costs of providing voice and data services over FWA**. The costs of spectrum included do not represent the average price paid for 700 MHz spectrum. It would be necessary to deploy some core network functions to enable access to the FWA network by multiple RSPs.

165 Further details on each of the above issues are contained in **Appendix F** and in Analysys Mason's report.

Operating expenses

Use of Chorus operating costs as the starting point

166 We support the Commission using Chorus' operating costs as a starting point for the HEO. Chorus' actual operating costs are the best available evidence of a nationwide fixed line network operator in New Zealand, regardless of the type of MEA being modelled.

167 Chorus is structurally separated and publicly owned. It operates as a standalone efficient business, unlike some other countries' network operators, which are vertically integrated and can share costs between divisions. Chorus' cost profile also reflects its TSO obligations, and other country-specific factors including wage costs and spatial and geographic considerations which the HEO would also experience.

168 Ernst & Young's 2013 independent assessment for the Crown found that Chorus' operating costs (including common costs) to income ratio is in line with industry averages for comparable infrastructure businesses in New Zealand and Australia.[52]

169 We reviewed the Commission's draft determination and modelling of the HEO's likely operating and non-network costs. While there are detailed differences in methodology and interpretation between Analysys Mason's assessment of Chorus' costs and the Commission's approach, the net effect of these differences in approach is not significant in comparison to the conceptual issues noted below. For this reason, we have not focussed on those points of detail in this submission; however, we are continuing to investigate the issue.

170 There are three important conceptual issues with the Commission's approach for opex. These are:

170.1 **the optimisation of Chorus' line fault index rate** (**LFI**). LFI benchmarking has resulted in the double-counting of expected efficiency gains, and benchmarking is not appropriate here because actual data is available;

[52] Ernst & Young "Independent Assessment of Chorus' Financial Position" (12 December 2013), Appendix 7.

170.2 **the 50% fibre efficiency adjustment**. The most recent available industry evidence is that a shift from copper to fibre will result in operating costs savings of between 15% and 30%. No robust data supports the Commission's finding of 50% savings, which appears to be based on indicative forecasts rather than reported data; and

170.3 **aerial opex adjustment**. The Commission has not made any adjustment for higher aerial opex versus underground. This has resulted in costs being inappropriately excluded from its model.

Optimisation of LFI

171 We agree with the Commission's draft decision not to benchmark Chorus' operating costs against other fixed line network operators.[53]

172 As the Commission's advisors TERA have recognised in their reports for the Commission, benchmarking can be a useful cross-check but should not be employed where actual data is available, because of the risks of under- or over-recovery and because benchmarking inadequately accounts for New Zealand-specific conditions.[54]

173 The Commission has benchmarked Chorus' LFI against its estimate of the likely fault rate on a new build copper network. It then applied a pro rata reduction to Chorus' actual maintenance costs based on the difference between Chorus' observed LFI and the Commission's expected 9.9% figure. However, the Commission's application of the LFI benchmarking step *before* considering the efficiency adjustment associated with operating a fibre MEA results in double counting of cost savings expected in network maintenance costs.

174 That is because the 40-60% opex reductions cited by the Commission to support its conclusion that fibre opex is 'half' that of a copper network were estimates relative to those vertically integrated operators' existing legacy assets, not against a notional new build copper network.

175 We comment further on the 50% opex adjustment below. But, to apply the LFI benchmarking before the overall opex adjustment leads to inappropriate double-counting of cost savings and therefore under-recovery. It is not compatible with an orthodox TSLRIC approach.

Opex efficiency assessment for fibre

176 The Commission assumes that the HEO's fibre opex for a fibre MEA will be equal to 50% of Chorus' opex. However, recent evidence suggests that the opex savings reduction following a shift from legacy copper assets to fibre assets is likely to be in the order of 15% to 30%.

177 In reasoning that fibre opex should be significantly less, the Commission does not refer to actual in-service cost data from network operators. Instead, TERA's report for the Commission relies on *projections* of expected cost savings:

[53] TERA "Model reference paper" (November 2014) at [4.3.6].

[54] TERA "Model reference paper" (November 2014) at [4.3.6].

177.1 a 2010 Ericsson sales brochure,[55] in which Ericsson touts "considerably lower" fibre opex costs compared to copper and HFC networks as a selling point for its Deep Fibre Access solution (consisting of fibre access nodes, aggregation switches, and DSLAMs). No statistics or operator data is cited by Ericsson;

177.2 an undated FTTH Council Europe website page,[56] which lists potential categories of cost saving opportunities for a fibre network operator. The FTTH Council document does not cite any specific evidence or statistics about the in-service cost reductions of fibre network versus copper; and

177.3 an 2010 AGCOM slide deck,[57] which cites an "NTT / Verizon" opex decrease of 40% - 60% for FTTH relative to copper local loop. No specific NTT or Verizon source is listed, nor are the dates given during which the 40-60% cost reduction was experienced. Our review of publicly available sources does not suggest NTT or Verizon has in fact achieved cost savings of that magnitude.

178 The best evidence to underpin any opex adjustment is the *actual* network operating cost savings achieved by network operators. Recent international best evidence is that operators are experiencing network operating costs for fibre of between 15% and 30% less than a legacy copper network:

178.1 a 2013 FTTH Council Americas study, based on a survey of managers at more than 350 telecommunications providers with active fibre connections, found that those firms had experienced average reductions in operations costs relative to copper of around 20%. Of those telecommunication providers surveyed, the majority experienced operation costs reductions in the 0% to 19% range, and the average estimated reduction was 20.4%.[58] The key findings are shown in Figure 11, below;

178.2 TERA's 2013 report to the Danish national regulator places the efficiency savings for copper versus fibre at between 17% and 30%. TERA's assessment of the MEA to model the LRAIC costs of the Danish telecommunications network included an analysis of the cost efficiencies of operating a fibre network relative to copper.[59]

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55 Ericsson "Point-to-point deep fibre access" (2010).

56 FTTH Council Europe "FTTH Business Guide" 4th Ed (10 February 2013); available at http://www.ftthcouncil.eu/documents/Publications/FTTH_Business_Guide_2013_V4.0.pdf.

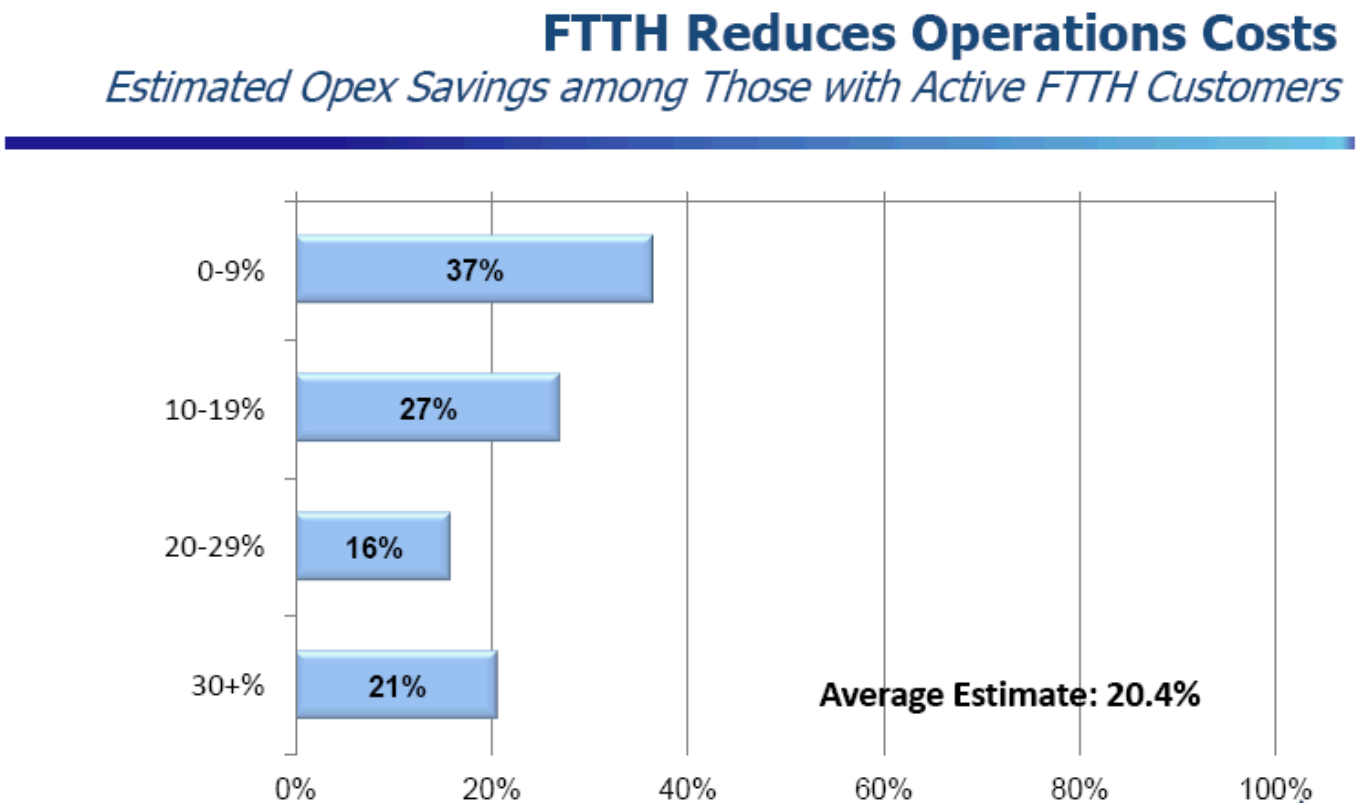
57 AGCOM (Italian NRA), "Challenges in moving towards the Next Generation of Fixed and Mobile Networks, January 2010", slide 9. Available at http://www.agcom.it/documents/10179/539715/Studio-Ricerca+29-12-2011+13/700e9ee0-154b-410e-a2ce-9a4a32cac861?version=1.0.

58 Fibre To The Home Council "Telcos saving serious money by upgrading to FTTH, survey finds" (press release, 2 April 2013). Available at http://www.ftthcouncil.org/p/bl/et/blogid=3&blogaid=182.

59 TERA "Modification and development of the LRAIC model for fixed networks 2012-2014 in Denmark: MEA Assessment" (May 2013) at page 23.

179 Against the above evidence, the Commission's decision to apply a 50% opex reduction is not supported. If an adjustment is made, it should be in the range of 15% to 30%.

Figure 11: FTTH Council Americas study on opex reductions



Source: FTTH Council Americas "FTTH Progress In North America" (2 April 2013)

Fibre reduction is only relevant to network operating costs

180 Fibre transition is only likely to impact network operating costs, with reductions in maintenance costs primarily resulting from a lower fault rate on a fibre network than on legacy copper.

181 All other costs, including non-network operating costs, are likely to be much the same for a fibre network operation as the costs associated with operating a copper network. Customer services costs, corporate support costs, regulatory levies, and directors' fees and expenses are some examples of operating costs that would be same for an HEO operating a copper or fibre network.

182 In its modelling for the Danish national regulator, DBA, TERA only applied an efficiency adjustment to maintenance costs, not to all operating costs.[60] Therefore the Commission should revisit its draft decision that all operating expenses will reduce by 50% on a fibre network.

Aerial opex adjustment

183 The Commission should adjust opex to reflect the higher maintenance costs associated with aerial relative to underground.

184 The Commission assumes 36% aerial deployment in its model. However, the Commission has utilised Chorus' fault costs data which reflect 2% aerial deployment with the remainder of Chorus fixed line network being underground.

185 Those higher costs associated with fault costs on an aerial network relative to underground reflect:

185.1 increased maintenance expenses, including inspection of, and replacement of, poles supporting aerial cables;

185.2 costs associated with suitably qualified workers undertaking maintenance in the electricity lines corridor – Beca expect such workers to be roughly double the costs of telecommunications technicians working away from electricity lines;[61]

185.3 service interruption and emergency maintenance to respond to network outages, generally caused by "car versus pole" incidents or vegetation interference with lines;

185.4 operational expenditure on vegetation management; and

185.5 routine and corrective maintenance.

186 None of these cost categories are incurred in an underground network at such a level. Together they are significant. Each New Zealand electricity lines company annually expends several million dollars on these costs. For example, Powerco,

[60] TERA "Modification and development of the LRAIC model for fixed networks 2012-2014 in Denmark: MEA Assessment" (May 2013) at page 23.

[61] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), Appendix 2.

with 30,000km of electricity lines, has allowed approximately $19 m per annum in FY2014 for service interruption and emergency maintenance, vegetation management, and routine and corrective maintenance under its annual maintenance plan (including all network inspection and minor corrective repairs not categorised as capital expenditure).[62]

ARMIS analysis

187 Analysys Mason has used FCC ARMIS data (for years up to 2007) to calculate the annual maintenance expense per cable sheath kilometre for aerial, underground and buried cable types, as well as pole and conduit expense for the US incumbent local exchange carriers (**ILEC**).[63]

188 Their analysis shows that, in 2007, for large companies, the annual expense of aerial cable (including pole costs, but excluding aerial data) was, on average, 67% higher per cable sheath kilometre per annum than the buried cable rates.

189 Analysys Mason also found the Irish national regulator ComReg reached a similar conclusion in its look at ARMIS data by Europe Economics. It found significantly higher operating expenses for aerial than for ducted cable over time (up to 2002). This analysis suggested a 1.21% increase for the expenses per 1% increase in the amount of aerial cable.[64]

190 Both these examples support an increase in operating costs to reflect an HEO operator which deploys a higher percentage of aerial than Chorus' existing network. This increase in operating costs is also consistent with the Commission's own statements about aerial opex being higher.[65]

Calculation of the TSLRIC-based price for UCLL and SLU

191 We have commented on the Commission's aggregation approach to setting prices for the UCLL and SLU services in our previous submissions.[66]

192 The aggregation approach is a practical response to the Commission's MEA choice as it is difficult to calculate a SLU price using an FTTH MEA. However, our expectation if the Commission modelled the SLU price using an FTTN/Copper MEA would be that it would be similar to the UCLL price.

The UCLF Price

193 The Commission has reconsidered its approach to the price for the UCLF service from the IPP Determination. It now considers that it should set a price for the UCLF service equal to the price for the UCLL service. Previously it adopted an average price for both non-cabinetised and cabinetised lines. However, on the

[62] Powerco "Asset Management Plan 2013" (March 2013) at [9.5].

[63] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015)) at [5.2].

[64] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [5.2]; Europe Economics "Operating costs for the access network in Ireland: and econometric approach" (27 February 2004).

[65] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [293].

[66] Chorus "Submission on Commission's framework and modelling approach" (6 August 2014) at [146].

Commission's preferred approach to aggregation, no difference in price results from this change in approach.

194 Based on the Commission's approach to aggregation, it is unnecessary to resolve the interpretation of the UCLF initial pricing principle. However, it may be necessary to revisit this question in the event that the Commission departs from its aggregation approach in the future. We also note that Chorus' own modelling shows that the cost and price of UCLF is expected to be higher than UCLL under an alternative to the aggregation approach.

PART TWO: UBA SERVICE

The service to be modelled

195 We agree with the Commission's general approach to and selection of an MEA for the "additional costs of the UBA service" – i.e., based on Chorus' existing FTTN/Copper network, for the reasons we have provided in our previous submissions. Starting with the current copper network will create the right build/buy incentives for the service and is required by the Act.[67] We also agree with the Commission's approach to asset valuation of the network.

Technology and network design choices

Throughput

196 In the real-world, the dimensioning of a network and its cost will depend on the amount of traffic to be delivered through that network. Accordingly, a cost model which is representative of a real network needs to consider bandwidth requirements in order to meet the current and future demand for data traffic.

197 The Commission acknowledges that the HEO would need to be "dynamic" and adapt its network to meet increases in throughput demand over time.[68] However, the Commission appears to assume that, because Chorus' existing architecture is consistent with what an HEO would initially deploy, then no adjustments are needed to reflect future throughput increases.

198 In our view, the draft model should be amended to account for changes to network assets required by future demand increases.

199 For the reasons which we have explained, in the context of the Commission's consideration of Chorus proposed Boost commercial variants, Chorus' position is that UBA STD provides for a minimum throughput level of 32 kbps to be provided.[69] While we understand that there is a difference of opinion on this point, that difference is not material to the pricing review determination process as we agree that the FPP should be applied to the service that is actually provided by Chorus pursuant to the STD.

200 The corollary of this is that Chorus should not be expected to invest in equipment which is not dimensioned in the Commission's modelling decisions regarding the UBA service in the regulatory period. For example, if the Commission models a single 1 GigE backhaul link for each DSLAM, and costs the UBA service on this basis, Chorus should not be expected to invest in a second 1 GigE backhaul link during the period as such investment will not be repaid. There should be a direct and meaningful link between modelling decisions and ensuring investment to meet growth in demand.

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[67] Analysys Mason "Cross submission on behalf of Chorus on UBA FPP process and issues paper" (5 March 2014) at [1.1]. See also James Every Palmer "FPP determination: Issues re service description and the modern equivalent asset" ("**Service description and MEA paper**") (12 March 2014) at [29].

[68] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [239].

[69] Chorus "Submission in response to the Commerce Commission's issues paper relating to assessing Chorus' new UBA variants – Boost HD and Boost VDSL" (18 July 2014), Appendix B. See also Minter Ellison Rudd Watts "Memorandum of advice on Commission legal advice dated 3 September 2014 on proposed changes to the regulated UBA services" (18 September 2014) from [6.1].

201 Chorus expects average throughput demand per end-user of approximately **[RI:]** at the beginning of the regulatory period in 2015 to grow significantly in the first five years. Chorus projects that demand may rise to **[RI:]** by the end of 2020.

202 These projections assume historic rates of growth in demand during the regulatory period. However, the market for broadband products is dynamic. If growth in demand for throughput in the regulatory period is greater than historic rates of growth, a review may be required to revise the price for the service if the Commission wishes to incentivise investment to meet this demand.

203 The Commission model should include the costs of serving current and future demand for data traffic. A model that accounted for throughput would consider:

203.1 DSLAM to FDS backhaul dimensioning (the Commission has allocated a single 1 GigE per subrack);

203.2 contention issues at the FDS (the Commission has assumed no contention issues will arise); and

203.3 allocation of core network costs (the Commission has not distinguished between allocation of core network electronic costs and allocation of passive assets; in each case these are allocated based on the number of services).

204 We explain this approach in more detail in **Appendix G**.

205 In short, even without taking allocation of core network costs into account, within the next 5 years some of the assumptions in the Commission's model would need to be revisited based on expected growth and/or if growth was greater than anticipated today. The Commission cannot therefore be confident that its modelled price properly accounts for throughput for any term longer than 5 years, or at levels higher than predicted by historic growth.

206 Analysys Mason's model of the costs for the UBA service accounts for bandwidth as well as end-user lines when dimensioning active equipment on the network.[70] TERA should be instructed to modify its model to undertake this exercise.

Network build costs

Asset valuation

207 We continue to support the use of an ORC methodology for all assets.[71] The forward-looking TSLRIC pricing principle by definition excludes backward looking considerations, and so ORC is mandated by the Act.[72] The reasons for our position on this topic are summarised in Part One of this submission.

[70] Analysys Mason "Model user guide for UBA model" (28 November 2014) at [3.2.5].

[71] Chorus "Submission on UCLL FPP process and issues paper" (14 February 2014) at [65]; Chorus "Cross-submission on Process and Issues paper for UCLL FPP" (28 February 2014) at [29].

[72] CEG "Non-replicable assets and forward looking cost" (August 2014) at [4] and [8]-[12].

Dimensioning

208 The most significant issue in relation to the dimensioning of the modelled network is how expected throughput is to be modelled. We have set out our view on this above.

209 Analysys Mason has also identified that the Commission's model incorrectly allows for only one SFP port for each 1 GigE or 10 GigE backhaul link.[73] This should be changed so that two SFPs are dimensioned for each 1 GigE or 10 GigE port connection (one at each end), with network topology taken into account and SFPs for varying transmission distances deployed. The Commission should ask TERA to revise its model to take account of this issue.

Unit costs

210 The capital costs of active equipment should include both material costs and indirect capital costs that would be incurred by an HEO. These include the costs of installation and commissioning equipment, connection to the network and connection of power, design and testing, and any overhead fees charged by service companies for the installation of the equipment. These costs are incurred by Chorus, and would be incurred by an HEO installing and maintaining the equipment.

211 Analysys Mason has investigated the unit costs used by TERA.[74] While the basis for the unit cost is not completely clear from the model documentation, it appears that TERA's capex unit costs exclude indirect costs associated with capex. These should be revised to include these costs.

212 The indirect costs for the relevant assets were provided by Chorus in its response to the Commission's section 98 notice.

Additional costs

213 Deployment of active equipment in cabinets will, in many cases, require additional facilities to be deployed at cabinets than would otherwise be the case if the cabinet was designed only to serve a Layer 1 service. Accordingly, the "additional costs" of provisioning the UBA service over a FTTN/copper network should include the incremental cost of providing the additional facilities to house active electronics (including both direct and indirect costs).

214 Analysys Mason has investigated the treatment of cabinets in the Commission's model.[75] They advise that, while TERA includes some additional power related capex for cabinets in the UBA model, these represent only part of the costs of upgrading cabinets to enable deployment of the active equipment required to support the UBA service. For example, no additional cooling or space is provisioned for cabinet-based DSLAMs.[76]

[73] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [4.4].

[74] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [4.1].

[75] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [4.3].

[76] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [4.3].

215 TERA should be instructed to include these additional costs in its model. Analysys Mason has implemented this in its model of the UBA service.

Exclusion of capital costs

216 We are opposed to the exclusion of capital costs required to deliver the service from modelled TSLRIC, on the basis of assumed capital contributions. Our reasons for this view are equally applicable to the exclusion of capital costs in relation to the UBA service as they are in relation to the UCLL service: see paragraphs [95] to [105] above.

217 However, if hypothetical capital contributions are taken into account, then two improvements to the Commission's approach should be made.

Exclusion of DSLAM capital costs

218 First, if the RBI initiative is used as a proxy for the deployment strategy of an HEO to provide a UBA service over Chorus' existing FTTN/copper network, only the costs of cabinets in RBI areas should be excluded, not DSLAMs.

219 The RBI initiative did not fund DSLAMs on the basis that, once base infrastructure was deployed, an economic case for deployment of DSL technology existed based on the then monthly charges – i.e., DSLAM deployment could be funded adequately through the rental price. DSLAMs were therefore not included in the definition of "grantable assets" on which RBI funds could be expended.[77]

220 The RBI funding model is consistent with the economic barrier to deployment of network to deliver UBA in remote areas being the high cost of base infrastructure (primarily, Layer 1 infrastructure). Once the base infrastructure is funded, an economic case for deployment of the necessary electronics to provide UBA exists at an appropriate monthly rental charge.

221 Accordingly, the full capital costs of all DSLAMs required to provide the UBA service should be included in the Commission's model.

Capital contributions should be implemented as one-off payments

222 Second, as for UCLL, any exclusions should be implemented as a one off benefit, rather than assuming that all equipment funded by a contribution will also be replaced with an equivalent contribution. See UCLL response outline.

Cost allocation of network costs between bitstream and other services

223 We support the Commission's approach to cost allocation for network costs based on capacity rather than Shapley-Shubik approach. However, in the case of the areas in which the Commission has identified that data is not available to allocate cost based on capacity, we consider that allocation based on a modified EPMU approach is to be preferred to the Commission's reliance on TERA's expertise and will give a better and more realistic allocation of cost based on known cost drivers.

[77] Rural Broadband Agreement, 20 April 2011, Schedule 2.

224 The two areas which the Commission has identified as lacking data to implement a capacity-based allocation approach are fibre links:[78]

224.1 between active cabinets and the parent exchange (TERA has proposed allocating 2/3 of the cost to bitstream services and 1/3 to other services). TERA's logic assumes that Chorus can allocate 1/3 of core costs to voice services,[79] but Chorus does not have a core voice business; and

224.2 between exchanges and FDS exchanges (TERA has proposed allocating 1/3 to the bitstream services and 2/3 to other services).

225 The allocations to bitstream services proposed by TERA are not explained in the draft determination, but if intended to reflect an assumed capacity or cost based allocation, are very low. Applying a modified EPMU approach would simplify the number of cost allocation keys used by the model, and ensure that non-price regulated services bear an appropriate proportion of shared/common costs if such services are priced above a normal return.

226 We understand that the Commission has sufficient data to utilise a modified EPMU approach to allocate costs between bitstream and non-bitstream services.

Cost allocation between bitstream services

227 We support the Commission's preferred option to address cost allocation between the regulated UBA service and any commercial service that subsequently develops a material demand by initiating a section 30R review.

228 In our view, the following factors support the Commission's approach:

228.1 there is no commercial service with material demand presently in the market;

228.2 given the uncertainty in the take-up of any commercial services, and the uncertainty associated with cost allocation with services, it is doubtful whether a robust price change mechanism could be developed at this stage.

229 A section 30R review is capable of occurring reasonably promptly should material demand develop, and will have the basis of further information on the nature of the commercial service and demand.

EUBA variants

230 We agree that the Commission should continue to provide pricing differentiation between the EUBA service variants contained in the UBA STD.

231 If the Commission's model remains indifferent to throughput variations of the level of the EUBA service variants, we support the use of benchmarking, based on

[79] TERA "Model Specification" (November 2014) at page 68.

the Commission's IPP determination for the UBA service, to provide pricing differentiation between the EUBA variants.

PART THREE: COMMON ISSUES ON UCLL AND UBA DRAFT DETERMINATIONS

232 This Part of our submission responds to common issues in the Commission's draft determinations for the UCLL, SLU and UBA services, in particular, the issues of:

232.1 WACC;

232.2 recognising asymmetries in estimating the WACC and TSLRIC price;

232.3 demand;

232.4 depreciation; and

232.5 tax.

233 We have instructed experts to consider a number of aspects of the Commission's draft determination on these issues. We provide with this submission the following expert reports from CEG and Professor Jerry Hausman of MIT:

233.1 CEG "WACC Parameters in the UCLL and UBA Draft Decision" (February 2015) ("**WACC Parameters**")

233.2 CEG "Uplift asymmetries in the TSLRIC price" (February 2015) ("**Uplift**")

233.3 CEG "Evidence on price trends" (February 2015) ("**Price Trends**")

233.4 Professor J Hausman "Response to Commerce Commission Draft Determination on Uplift" (February 2015) ("**Hausman**")

234 Our detailed discussion of the WACC parameters and asymmetry issues is set out in **Appendix H**.

WACC

235 The determination of the WACC for UCLL and UBA services is a key input into the TSLRIC price. The cost of capital must be set at a level that provides the financial return investors would require given the risk of the investment in those services and that investors have alternative options. This requires as a starting point that WACC should be set so as to provide NPV neutrality.

236 In considering what the appropriate level of WACC should be in order to provide for NPV neutrality, we agree with the Commission that an approach which promotes regulatory predictability is appropriate. This objective is consistent with section 18 of the Act.

Parameters

Asset Beta

237 The Commission should set an asset beta of 0.50. This is based on:

237.1 a review of average asset beta over the past 20 years conducted by CEG using the methodology from the Commission's input methodologies

determinations endorsed by the High Court on appeal.[80] Applying the same methodology for Chorus will promote regulatory predictability and stability;

237.2 analysis that shows that the only time that betas have been at or below 0.4 is the period affected by the Global Financial Crisis and European sovereign debt crisis. Since mid-2013 asset beta estimates have been above 0.4 (including for Oxera's preferred sample); and

237.3 the average beta determined in recent regulatory decisions in European countries – the most recent estimates have been around 0.5.

238 The Commission should have regard to the average asset beta for relevant firms over the past 20 years, including over the most recent period (to December 2014). This is because:

238.1 a long-run average is more resilient to market shocks;

238.2 asset betas estimated over the past 5 years (to 2013) have been depressed due to the effects of the Global Financial Crisis and European sovereign debt crisis;

238.3 empirical evidence, gathered by CEG, shows that beta for fixed line telecommunications businesses have not remained at the low levels that they fell to during the Global Financial Crisis and sovereign debt crises, and have returned to levels previously experienced prior to 2008. The five year period to December 2014 therefore cannot be considered to be representative of future expected economic conditions.

239 As to the composition of the comparator set, the Commission should use the same revised sample as for its consideration of gearing (which excludes businesses with a market debt to capital ratio more than 50% higher or lower than their book debt to capital ratio), with weight given to fixed line businesses.

240 Our more detailed analysis is set out in **Appendix H** and the CEG WACC Parameters paper.

Gearing

241 The Commission should give greater weight to considering the gearing of fixed telecommunications line businesses. The approach of ACCC and Ofcom, as well as most of the European regulators, has been to set the benchmark gearing based on the gearing of the regulated businesses. For integrated firms, where appropriate, regulators set different gearing between fixed and mobile businesses. Taking these considerations into account, an appropriate gearing for UCLL and UBA in New Zealand is 50%.

242 Further analysis of the appropriate gearing, including considering application of a reasonableness test to Oxera's refined comparator set, is set out in **Appendix H**.

[80] *Wellington International Airport Limited v Commerce Commission* [2013] NZHC 3289 at [1493] –[1547].

Cost of debt

243 We set out here the key points in relation to cost of debt. These points are discussed in more detail in **Appendix H** and in the CEG WACC Parameters paper.

(a) RISK FREE RATE

244 The risk free rate should be calculated by reference to averaging periods longer than the one-month average for Government five-year bond yields currently proposed by the Commission. One month averaging is inconsistent with the period considered in order to estimate the asset beta and is not appropriate due to the high volatility in Government bond yields since the financial crisis of 2008 (in which rates have fluctuated from a minimum of 2.6% to a maximum of 7.3%).

245 The Commission should estimate the risk-free rate on the basis of average values observed for different time periods, ranging from spot-rate to 5 year average.[81] This approach was adopted by the Commission in the telecommunications context in its Decision 672, and provides a more appropriate and predictable WACC estimate.

246 In its input methodologies determinations the Commission noted that the debt premium on corporate bonds and the risk-free rate are continually changing, thus the timing of when these rates are determined can have a material effect on the estimate.[82] This remains the case. Market yields on the five-year government bonds have been particularly volatile in the last five years with the movement in yield values. This volatility can be alleviated by implementing the approach adopted by the Commission in Decision 672, which is more appropriate in the context of New Zealand telecommunications.

247 The effect of the Commission's approach to the risk free rate is to set the WACC as the result of a gamble on timing around what date it will complete its pricing review determination process. No real world business could organise its financing to roll over all of its debt in a single chance month with unpredictable cost consequences.

248 The fact that the Commission has changed its final determination deadline a number of times adds to the volatility of the chosen methodology for the risk free rate determination. It highlights the difficulties (and uncertain costs) that a business would face in attempting to refinance concurrent with a regulatory decision, to be made on a date that has previously, and may again, change. Both the established and proposed new debt arrangements would be subject to last minute (and possibly repeated) change and corresponding break fees.

[81] Commerce Commission "Standard Terms Determination for the designated services for Telecom's unbundled copper local loop network service (Sub-loop UCLL), Telecom's unbundled copper local loop network co-location services (Sub-loop Co-location) and Telecom's unbundled copper local loop network backhaul service (Sub-loop Backhaul)" (18 June 2009).

[82] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010) at [H5.69].

(b) CREDIT RATING

249 Based on the CEG comparator group, and taking account of the practice of regulators such as ACCC and Ofcom, the Commission should use a credit rating of BBB-.[83]

(c) DEBT RISK PREMIUM (DRP) ON BONDS

250 In assessing the Debt Risk Premium (**DRP**), the Commission should give weight to the DRP on bonds issued by Genesis Power Limited, Mighty River Power Limited and Meridian Energy Limited. The uncertainty over the "New Zealand Power" proposal in 2014 which affected the bond issues by these electricity generators reflects the type of risk (a possible devaluation of assets through regular regulatory decision-making) which is relevant to the risk profile of an access provider facing regulation under TSLRIC.

251 On this basis, the Commission's estimate of DRP should be increased by between 0.07% and 0.16%, to reflect the bonds affected by the New Zealand Power proposal during the Commission's averaging period in July 2014.[84]

(d) DEBT SWAP COSTS

252 We agree with the Commission that the cost of entering swap contracts should be allowed for in the cost of debt. A reasonable compensation for the transaction costs of entering into swap contracts will be between 10 and 13 basis points if the debt can be raised domestically and more if some debt is raised overseas. Our assessment reflects:

252.1 that two swap contracts (rather than one) must be taken out to achieve the hedging benefits the Commission assumes in its draft determination;

252.2 information on the costs of swap transactions provided by reports submitted in recent regulatory proceedings in Australia which have considered the achievability of the cost of debt benchmark.[85]

253 The detailed reasoning and basis for the calculation is set out in section 3.4 of the CEG WACC Parameters paper.

(e) TERM FOR COST OF DEBT

254 The appropriate benchmark term for calculating the cost of debt is 10 years. This is consistent with the debt raising practice of a wide sample of international telecommunications firms.[86]

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[83] CEG "Response to Commerce Commission UCLL/UBA WACC consultation paper" (March 2014) at [16], [102], and [104].

[84] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.2.

[85] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.4.

[86] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.3.

(f) DEBT ISSUANCE COSTS

255 Debt issuance costs of at least 0.35% per annum should be used over a 7 year term or, if a 10 year term is used, the debt issuance costs should be at least 0.28% per annum. This is because a cost of capital should be applied to amortise upfront (non-recurring) debt issuance costs over time.[87] The Commission's current allowance of 0.25% is too low and appears to be based on an assumed cost of capital of 0%.

Reasonableness check

256 The Commission has compared its WACC estimate against a number of independent broker estimates for Chorus.[88] Those estimates are materially higher than the mid-point WACC estimate in the draft determination. Chorus' corporate WACC, calculated by an independent external financial advisor in July 2014, is 8.1% post-tax.

257 The Commission acknowledges that its WACC estimate is lower than independent estimates of Chorus' WACC, but appears to discount these estimates on the basis that they assess the WACC for Chorus' entire business (including UFB), rather than simply the UBA and UCLL services.

258 We agree that the Commission must set a WACC for the UBA and UCLL services. But this aspect of the Commission's reasoning is difficult to reconcile with its reliance in other parts of the draft determination on an HEO deploying a FTTH network to serve all LFC demand. On this assumption, independent estimates of Chorus' WACC would appear valid reasonableness checks.

259 Similarly, it is also relevant that the Commission's proposed WACC is also significantly lower than the WACC used by the Crown to assess business cases for the UFB network build. In its 2014 Annual Report, Christchurch City Holdings Limited also estimated the WACC for the fixed line network of Enable at 10% post tax as at 30 June 2012.[89]

260 As an additional reasonableness check on the draft WACC we have carried out an international comparison of allowed WACC premiums for fixed access telecommunication networks. The WACC premium proposed by the Commission is the lowest in the comparator group of eleven European jurisdictions, the United States and Australia.[90]

261 The results suggest that the Commission's cost of capital parameters affecting its WACC premium (i.e., its debt risk premium, TAMRP and asset beta) give a lower compensation above the risk free rate than the parameters set by regulators of comparable businesses.

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87 CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.1.

88 Commerce Commission "Cost of Capital for the UCLL and UBA pricing reviews: Draft Decision" (2 December 2015) at [264].

89 Christchurch City Holdings Limited "2014 Annual Report" (2014) at page 22.

90 CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 4.

262 In light of these results, and given the uncertainty in estimating these parameters, the Commission should review the parameters it has set to ensure that it allows the HEO a reasonable return based on NPV neutrality.

Recognising asymmetries in estimating WACC and TSLRIC

263 The Commission should include an uplift to its best estimate of the WACC for UCLL and UBA services to address the asymmetric consequences of setting the WACC too low. In addition, once the Commission has used the best available evidence and correct modelling assumptions to generate a range of TSLRIC estimates, the Commission should also include an uplift to its estimate of the TSLRIC price to address residual uncertainty in parameter estimates and asymmetric risks not addressed by the estimate of the WACC.

264 In this submission we use the Commission's language of an "uplift" to the WACC estimate and to the TSLRIC estimate as shorthand for the notion that the Commission "*should give weight to erring on the high side*"[91] in selecting its WACC estimate and its estimate of the TSLRIC price from within the range of possible estimates that the WACC calculation and the TSLRIC calculation allow as a result of a number of areas of uncertainty and risk within the estimation process.

265 In seeking an uplift, we are not proposing that the Commission depart from either an orthodox WACC or TSLRIC calculation, rather simply that it recognises the limits of modelling inputs, future uncertainties and asymmetric risk in order for the price to be NPV neutral. This must be done if the objectives of section 18 are to be met.

266 As the true WACC is unobservable, the estimation of WACC is inherently uncertain. By failing to address at least estimation error in setting the WACC, the Commission would ignore the fact that setting the WACC at the midpoint estimate will only result in NPV neutrality around half the time. In order for an investor to earn a normal return/mid-point WACC over the regulatory period, the Commission needs to consider a higher return than the mid-point WACC.

267 However, the uncertainty in estimating a TSLRIC price is not limited to simply the WACC parameters. As CEG explains,[92] in the context of TSLRIC regulation of the UCLL and UBA services, the asymmetric consequences of setting WACC too high or too low are important, but there are also a wider set of asymmetric consequences from setting the price too low which are independent of how the WACC is determined. Other inputs include the cost of building the modelled network, the cost of operating and maintaining the network, demand and asset lives and price trends of the network.

268 The Commission should endeavour to use the best available evidence for these modelling parameters. However, as such an estimate is inevitably concerned with

[91] Commerce Commission "Cost of Capital for the UCLL and UBA Pricing Review (Draft Decision)" 2 December 2014 at [209] and [217].

[92] CEG "Uplift asymmetries in the TSLRIC price" (February 2015) at [19].

forward looking costs, even the best estimate will have a risk of being too high or too low. As Professor Littlechild has noted:[93]

> To set the correct (inter-temporally consistent) level of TSLRIC requires a degree of knowledge and foresight by the regulator – not only of present but also of future technological and market conditions – that in practice is unattainable. The consequence of attempting to set prices with reference to TSLRIC has been, and will continue to be, a series of errors over time leading to inaccurate and inconsistent investment signals, unpredictable reallocations of income, increased risk for investors, a higher cost of capital and higher prices to customers.

269 The Commission must set a price that is NPV neutral if investment and innovation incentives are to be promoted. In this regard, the Commission notes that an estimated TSLRIC price should be set at the point investors are equivocal as to whether they build or buy. At the moment, given the asymmetric costs and risks, the estimated price favours buy. An uplift to the TSLRIC estimate would overcome these asymmetries and would, as we agree the Commission must, promote dynamic efficiency over static efficiencies in accordance with the section 18 purpose statement.

Expert analysis

270 We asked CEG to consider the Commission's draft determination to *not* uplift the WACC or TSLRIC price for the UCLL and UBA service.[94] CEG's analysis supports the Commission's stated view that there are asymmetric costs stemming from setting UCLL and UBA prices too low, relative to setting them too high.

271 We also asked Professor Jerry Hausman of MIT to consider Professor Vogelsang's paper and the Commission's approach to the questions of whether to apply an uplift to the WACC and/or the price derived by applying TSLRIC, concentrating particularly on:

271.1 the Commission's analysis of the asymmetric consequences of estimation error; and

271.2 the conclusions reached by Professor Vogelsang on uplift, particularly in relation to the implementation of TSLRIC in telecommunications pricing.

272 Professor Hausman's advice[95] is that there is a strong case for an uplift to the regulatory WACC or the final price point in order to address the asymmetric costs of underestimating TSLRIC (whether these arise through estimation error or as a result of a failure to take account of asymmetric risks from sunk and irreversible investments). His analysis is framed in terms of an uplift as a means of

[93] Stephen Littlechild, "TSLRIC and the nature of competition: A contribution to the review of New Zealand's telecommunications policy framework" (11 September 2013) at [18].

[94] CEG "Uplift asymmetries in the TSLRIC price" (February 2015).

[95] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015).

mitigating the asymmetric negative consequences on investment of applying TSLRIC pricing, which the evidence shows leads to asymmetric returns.[96]

Asymmetric costs and asymmetric risks

Asymmetric costs

273 As the Commission and Professor Vogelsang recognise, low prices for UCLL and UBA would:

273.1 send signals that are likely to impede migration from copper-based services to fibre-based services and reduce the incentive to invest in UFB; and

273.2 provide weaker incentives for Chorus to maintain and invest in its copper network in the long-run.

274 The Commission's view is that the costs to end-users of network outages for UCLL and UBA are likely to be significantly less than for electricity lines services because there are more readily available substitutes for fixed line telecommunications services. But this fails to properly address that:

274.1 critical services rely primarily on fixed line services;

274.2 mobile networks are themselves often dependent on fixed line services (although not generally UBA services); and

274.3 the wider economy (including most financial transactions and business interactions) also relies heavily on fixed line access services.

275 The potential loss to consumers from failure to invest is significant. Professor Hausman's analysis supports this point. He refers to a number of empirical studies which show significant welfare gains from investment in new telecommunications technologies (and the corresponding welfare losses where that investment does not occur),[97] but that TSLRIC access pricing can discourage such investment to the extent it leads to asymmetric returns (that is, all risk – from sunk and irreversible investments and potential technological obsolescence – on the access provider, without corresponding reward).

276 Professor Hausman's conclusion is that the "long-term benefit of end-users" requirement under section 18 means welfare gains to end-users of telecommunications is a critical consideration when considering whether an uplift is needed as:

276.1 consumers and businesses achieve very high welfare gains from the introduction of new and improved telecommunication services;

[96] Professor Hausman applies his analysis to the wider uncertainty in estimating TSLRIC rather than only the WACC input – see for example Professor J Hausman, "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [46].

[97] Professor J Hausman, "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [7]-[14]. See also CEG "Uplift asymmetries in the TSLRIC price" (February 2015) at section 3.1.

276.2 the internet is critical to consumers, businesses and government agencies to carry out communication and business activities, and to quality improvement of the internet, such as faster speeds and a reduction in congestion and outages. Network outages and congestion significantly degrade internet performance;

276.3 congestion and quality improvement of services is important for wholesale services (such as UCLL and UBA) as this will typically be the primary determinant of service quality for end-users. The "free option" given to RSPs under TSLRIC regulation distorts investment incentives; and

276.4 insufficient investment in telecommunication infrastructure can lead to economic difficulties, as evidenced by the experience in European Union telecommunication regulation, impairing the goal of regulation to promote consumer welfare.

277 Discouraging investment in the copper access network could in turn negatively affect the welfare benefits stemming from investment in fibre, in circumstances where not just the effect on Chorus' incentives to invest must be considered in setting prices, but also the incentives of its competitors (or potential competitors) to invest.

278 There are also likely to be significant welfare benefits from encouraging the migration of customers to fibre. The Commission acknowledges this in its draft determination and that this should mean it gives weight to erring on setting prices higher, but does not provide for an uplift. The Commission appears to do this on the basis of Professor Vogelsang's comments about generosity in the Commission's modelling. However, as we discuss further below, Professor Vogelsang's analysis of the modelling assumptions adopted by the Commission, given the statutory context, are not well-founded.

Asymmetric risks

279 The asymmetric costs of estimating the WACC and estimating the TSLRIC price too low, and the asymmetric risks that must be accounted for, can be considered separately. But, in the long run, concerns over asymmetric risks may actually be concerns over asymmetric costs, as in the long run providing compensation to a regulated business that is less than its expected average costs is likely to have negative welfare consequences from the consequent underinvestment.

280 Professor Hausman's advice goes to this point. TSLRIC pricing does not account for asymmetric risk from, for example, sunk and irreversible investments and from potential technological obsolescence. This provides a "free option" to RSPs. As explained by Professor Hausman:[98]

> If outcomes turn out to be good the RSP buys the service at a cost-based regulated price. If outcomes turn out to be bad, the RSP has not invested and is not required to help pay for unsuccessful investment. Thus, the RSP receives an option for free on the investment

[98] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [23].

outcomes financed by the regulated firm. This asymmetric return situation caused by the truncation of the upper end of the distribution of returns leads to a distortion in investment incentives for the regulated firm.

281 In addition to Professor Hausman's analysis, CEG identify other cash-flow asymmetries that justify an uplift. In particular:

281.1 the Commission's proposed compensation for catastrophic events does not provide a complete answer as there are risks which Chorus cannot insure for, as well as additional cost considerations. Notably, Chorus is not insured for distribution and transmission lines outside of the five largest cities. It also does not account for all the mitigation measures Chorus carries out to ensure its network is resilient in accordance with good international practice; and

281.2 critically, asset stranding, whether technological, competition or regulatory, is not compensated for in the Commission's draft determination. The risk of asset stranding must be recognised if NPV neutrality is to be achieved.

282 Asset stranding is not addressed completely by the (partial) adoption of Chorus' asset lives. As CEG advises, financial statements and the guidelines accountants must work to are different to the task required of the Commission in considering the extent the asset lives of the HEO should be impaired given the risk of potential technological stranding. Statements from Chorus' auditors as to obsolescence will not be fit for purpose as:[99]

282.1 Chorus' assets are not the same as the HEO's assets. Chorus's assets consist of aged assets of a copper network and the HEO network modelled by the Commission is the new assets of a fibre network; and

282.2 the Auditors' task is to impair an asset when its value is impaired (or is likely to be impaired) by a new technology. The task for the Commission is different: it must take into account the probability that technological stranding may occur over the life of a new asset, in order to provide for present value neutral compensation over time. The Commission must estimate the 'expected life' of the asset, which weights the potential lives of assets given technological developments and the probability of those developments.

283 To summarise, investment incentives which are central to section 18 considerations are affected by both the asymmetric costs of getting the TSLRIC calculation wrong as a matter of estimation error, and a range of asymmetric risks (including asset stranding and demand risk not otherwise addressed in the calculation of TSLRIC). If these issues are not recognised this can lead to an underestimate of the TSLRIC price – with asymmetric negative welfare consequences.

[99] CEG "Uplift asymmetries in the TSLRIC price" (February 2015) at [97] and [98].

284 Both issues support an uplift to the WACC estimate as well as the TSLRIC estimate. To some extent, the Commission appears to agree. But the Commission does not then provide for an uplift on the advice of Professor Vogelsang.

Generosities in the Commission's TSLRIC model

285 Professor Vogelsang's advice is that an uplift (either to the WACC or to the TSLRIC price point) is not warranted, primarily due to the Commission's modelling assumptions as to the valuation of reusable assets and its draft determination not to make a performance adjustment.

286 Professor Vogelsang's framework for analysis of this issue should not be accepted, since it contemplates a departure from forward-looking TSLRIC. The Commission's decisions to implement forward-looking TSLRIC with regard to asset valuation and performance adjustment are not "generous"; instead, they are simply following statutory requirements.

287 The Act presupposes that TSLRIC is designed to meet the statutory objectives of section 18 and Part 2 of the Act (consistent with the approach taken by the Court of Appeal).[100] Adopting an orthodox approach to TSLRIC is consistent with regulatory predictability and therefore promotes section 18. As CEG point out, Professor Vogelsang's analysis does not recognise the Commission's modelling choices:[101]

287.1 were driven by the need to implement TSLRIC within the framework of the Act; and

287.2 are not generous as implemented and would not be expected to provide compensation that would otherwise be considered in uplift considerations.

288 Any suggestion of a performance adjustment based on willingness to pay or technical differences would be unconventional and untested. It would also be unlikely to result in an estimate of cost as required by the Act. As noted by Analysys Mason, a performance adjustment would likely mean that the resulting price would not cover replacement costs.[102] As the Commission correctly notes, such adjustments would also be very difficult to estimate in practice, and unpredictable.[103]

289 In terms of reuse of assets, we consider Professor Vogelsang's argument, that by not modifying the TSLRIC method to take into account the re-use of existing assets the Commission is determining a higher price, and is in direct contradiction with the build/buy principles of the Act and promotion of efficient investment. Modifying the TSLRIC method to take into account the re-use of existing assets would lower the UCLL price and bias an RSP's build or buy decision towards purchasing regulated access at odds with the section 18 purpose.

[100] *Chorus v Commerce Commission* [2014] NZCA 440 at [44] and [153].

[101] CEG "Uplift asymmetries in the TSLRIC price" (February 2015) at section 5.

[102] Analysys Mason "Paper on framework and modelling approach" (6 August 2014) at [1.12].

[103] Commerce Commission "Draft determination for UCLL" (2 December 2014) at page 126.

290 Professor Vogelsang appears to consider the Commission's approach to its TSLRIC modelling is generous on the mistaken comparison with the UK and EU regulators which no longer adopt TSLRIC due to specific circumstances and different regulatory regimes found in those countries. The Commission has acknowledged that its decisions on these TSLRIC modelling issues were made for other reasons, including regulatory predictability and the New Zealand context in which its assessment is being made, including to give effect to section 18.

291 In addition, as described above, there are various offsetting aspects of any TSLRIC calculation, which means the overall price reached by adopting a TSLRIC methodology is not generous - as recognised by Professor Hausman and CEG.

Implementation of uplift

292 The CEG Uplift Asymmetries paper describes how the estimated WACC and the estimated TSLRIC price can be calculated to take into account these asymmetries.

293 While the Commission has an orthodox methodology for deriving an appropriate uplift to the WACC estimate, it has not previously had to estimate an uplift to the estimate of the TSLRIC price. CEG explain that Monte Carlo analysis could be used to simulate the uncertainty in key TSLRIC modelling parameters (including the WACC) and how this information could be used to estimate uncertainty in the resulting TSLRIC prices for UCLL and UBA.[104]

Demand

294 It is important that the Commission's model use the best available forecast of the volume of products that the regulated entity (Chorus) is able to provide over the regulatory period in order to provide for NPV neutrality which is central to regulatory predictability.[105] Any other approach cannot accurately estimate the unit costs of providing the regulated service. The starting demand should be Chorus' current demand and the modelled demand should change in each year of the regulatory period based on the forecast change in Chorus' demand.

295 Orthodox TSLRIC contemplates that the efficient operator may offer other services on the assets used to provide the regulated service. This explains why the statutory definition of TSLRIC refers to the service provider's provision of other telecommunication services which requires allocation of common costs. However, it is not part of TSLRIC to model the costs of services sold by different parties.[106] The statutory definition of TSLRIC refers to the "*service provider's provision of… services*" (Clause 1, Subpart 1 of Schedule 1). It is not about the provision of all fixed copper (or fibre) networks.

296 The approach the Commission currently proposes to take is to define the *total service* to include services beyond those supplied by Chorus using its networks to include services supplied by other providers using other assets (in particular, the non-Chorus LFCs: Northpower Limited, Waikato Networks Limited and Enable

[104] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 6.

[105] CEG "Demand in forward looking cost models" (August 2014) at [18].

[106] Note reference in 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) at [106].

Services Limited). This is contrary to the statutory exercise to be performed and contrary to orthodox TSLRIC.

297 The Commission's proposed approach will result in the assumed efficient costs being spread across volumes of services sold by providers other than Chorus or an HEO serving Chorus' demand. This sets an unattainable level of efficiency for the HEO and Chorus and jeopardises NPV neutrality as it does not allow the HEO or Chorus a chance of recovering efficient forward-looking costs from the demand it actually serves.[107] Put another way, by spreading the modelled cost for UCLL and UBA across services provided on other infrastructure, the Commission will, in the presence of economies of scale, understate the unit costs of providing the regulated service. CEG advises that this is an error in deriving the forward-looking costs of providing the regulated service.[108]

298 As the Commission's approach will not allow the HEO or Chorus a fair chance of recovering forward-looking costs from the demand it actually serves, it will also deter investors from committing capital as, even if they can be as efficient as the HEO, they will earn less than 100 cents in the dollar from future investment.[109] No investor in an HEO would invest to deploy network on this basis.

299 The Commission's approach is also contrary to the build/buy rationale of TSLRIC. Setting a price below an efficient price by including demand supplied by other service providers creates a barrier to efficient entry since an actual new entrant that is more efficient than Chorus could still be discouraged from entering the market if it cannot match the regulated price which is set below the efficient price based on serving the demand of Chorus and other LFCs.

300 The approach is also inconsistent with EC recommendations and TSLRIC practice in many jurisdictions including Sweden,[110] Germany, France, Ireland, Australia, and the United States. International regulators, even European regulators, have started with the incumbent's actual demand forecast when conducting a TSLRIC assessment.[111]

301 The Commission has proposed to include other LFCs' demand on the grounds that it considers UFB to be "*more akin to a replacement of, rather than a competitor to, the existing copper network*".[112] That is, the Commission is envisaging a hypothetical scenario in which all copper and UFB demand is served by an HEO, and the other LFCs do not exist.

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[107] CEG "Demand in Forward Looking Cost Models" (August 2014) at [13].

[108] CEG "Demand in forward-looking cost models" (August 2014) at [79].

[109] CEG "Demand in Forward Looking Cost Models" (August 2014) at [36] and [46].

[110] PTS has had prices increasing for the UCLL equivalent due to demand shifting to alternative fibre operators.

[111] Refer for example to Sweden Post and Telecom Authority "Draft Model Reference Paper Guidelines for the LRIC bottom-up and top-down models" (4 February 2010) at page 19 and TERA Consultants "Modification and development of the LRAIC model for fixed networks 2012-2014 in Denmark: Draft Model Reference Paper" (May 2013) at page 55. In Denmark the HFC was included because the HFC was provided by the incumbent. We believe that Denmark is the 'outlier' in assuming constant demand.

[112] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [495].

302 This approach is an inappropriate use of the HEO concept. The HEO is an instrument for making an assessment of the most efficient technology and network design for delivering the regulated service in a forward-looking network. When the Commission extends the HEO concept to the choice of demand, and uses demand which is greater than demand for the regulated service, it will result in an under-estimate of TSLRIC. Such an underestimate would fail to achieve NPV neutrality and would create inefficient build/buy incentives.

Depreciation

Price Trends

303 In order for the depreciation profile to be as accurate as possible, and thereby provide for NPV neutrality, it is important that the forecasts for the costs associated with asset replacement (price trends) are sound and fit for purpose.

304 A tilted annuity calculation seeks to assess the change in value of the assets across the regulatory period to provide for NPV neutrality. The line of the depreciation profile 'tilts' reflecting the annual expected change in the replacement cost of the components which make up the MEA. The 'tilt' in the tilted annuity is a proxy for the expected change in the ORC of each asset. Importantly, the price trend is the annual change in the value of the asset over the long term. This means that an assumption beyond the regulatory period as to the change in the value of the MEA must be applied. This will ensure the NPV neutrality principle is maintained and avoid windfall gains and losses.

305 The tilted annuity formula therefore requires a long term forecast of price trends for the technology being modelled in order to address the continuation of the asset beyond the regulatory period. The use of a short term forecast for the regulatory period at each reset, as currently modelled, will capture short term fluctuations in price and therefore does not allow for NPV neutrality over the life of the investment.

306 The use of a short term forecast is particularly problematic where, as CEG highlight, recent positive economic conditions in New Zealand are unusually high in particular parts of the economy and particular regions. Accordingly, they are not reflective of the long term or even national experience. In particular, building and civil construction costs are high given the Canterbury rebuild.[113]

307 The approaches used by the TERA model to estimate price trends can be improved. The detail of the suggested improvements and the rationale for them are set out in the attached CEG Price Trends paper.[114]

308 In summary, the improvements include:

308.1 using the labour index from Statistics New Zealand for technicians and associates as this better reflects the labour that would be used to build and maintain the fixed assets used in the hypothetical network and is what Chorus uses in its commercial contracts;

[113] CEG "Evidence on Price Trends" (February 2015) at [86].

[114] CEG "Evidence on Price Trends" (February 2015) at [89].

308.2 using more reliable sources for fibre cable forecasts rather than the index currently adopted by TERA, which is made up primarily of other (non-fibre) types of wires and cables (for example power cables, which are primarily copper) and so is unlikely to provide an accurate estimate of the price trend for fibre cables;

308.3 taking the long-term trends in Capital Goods Price Index (**CGPI**) as an appropriate reference for estimating future trends in ducting and trenching costs, with particular reference to the CGPI "civil-construction group" index which provides a better approximation for the costs associated with trenching and ducting for a telecommunications network. We note that Beca's recommendation of price trends for ducting and trenching are not reliable as they are based on a one-year movement in particular (and some less relevant) indices from Statistics New Zealand for the year to June 2014;

308.4 adopting forecasts for copper and steel rather than relying only on historical price information; and

308.5 other adjustments for consistency with available information on long term trends.

Time to Build

309 We agree with the Commission's assumption that a 6 month period is appropriate to reflect the period of time when the requirement for the asset is identified and it may be ordered, and the "operational but not needed yet" phase when the asset has been commissioned, uses floor space and energy, and needs maintenance to make sure it is working.

Tax

310 We generally agree with the Commission's approach to tax, save for its position on the valuation of tax deductions.

311 Given the Commission's objective is to calculate an HEO's cost of service provision in New Zealand, it is important that in building the model, it makes realistic assumptions about all aspects of the HEO's business, including its tax position.

312 The Commission's approach to tax is not realistic because while it assumes for the purposes of calculating tax generally that the HEO's business makes tax losses in the early years, it makes an unreasonable assumption for the purposes of valuing tax deductions. It assumes for this latter purpose that the HEO has other business lines which ensure that the business is always in a tax paying situation, such that all tax deductions are valued at 28%. But for any business, there is a non-zero probability that at any given time it would be in a tax loss position, and this is even more likely for an HEO building a new network.

313 The Commission's model indicates that taxable income relating to the UCLL and UBA services is negative for the first three years.[115] This is because diminishing

[115] The impact of the Commission's approach can be seen in row 22 of the Commission's "Tax-model-30-September-2014".

value tax depreciation front loads depreciation. However, the Commission's modelling assumes that all tax deductions are valued at 28% in those years, despite taxable income for the regulated services being negative. The effect of these assumptions is that the HEO is unrealistically modelled with a *negative* effective tax rate (i.e., the HEO receives payments from the IRD), and so the HEO's costs are underestimated.

314 The Commission has suggested it reasonable to assume that the HEO's tax position would include a wider group of other telecommunications services. It considers this is consistent with the definition of TSLRIC and the reference to "the service provider's provision of other telecommunications services".

315 Put another way, the Commission's position rests on the assumption that the HEO is not just building the efficient MEA network today, but it has also invested in some other New Zealand telecommunications services several years ago to ensure it had enough taxable income to offset initial losses. This stretches the hypothetical framework too far since:

315.1 the definition of TSLRIC and its reference to "*taking into account the service provider's provision of other telecommunications services*" must be grounded in the reality of the services Chorus can provide given the limits under the Act. Otherwise, the HEO methodology is requiring an unrealistic standard of efficiency and will not achieve NPV neutrality;

315.2 if the HEO is also simultaneously entering other business lines then these business lines will add to the tax loss problem, not solve it. In order for the Commission's logic to work, the HEO must have entered these other business lines years earlier and already have used up its accelerated depreciation allowances from those business lines. This effectively assumes that the HEO is a pre-existing business, an assumption which (outside of the allocation of common costs)[116] is inconsistent with the rest of the Commission's modelling;

315.3 it does not recognise the reality that even multi-operations businesses can nevertheless make an overall tax loss at various times as part of normal business operations;

315.4 in terms of considering competition in the market in determining the price, for the purposes of estimating the price to be set adopting a TSLRIC methodology, it is the competition of the HEO providing the service (given the build/buy framework) which must be considered. Therefore, it is the costs of the HEO, including its tax costs, which must be considered, in the same way the capex and opex of the HEO must be considered. There is no principled basis to distinguish tax costs from the HEO's other costs.

316 The Commission should model tax costs explicitly within its model. In doing so it should take account of the HEO's early tax losses, accumulating these in the

[116] We note that in reality the other services are a very small part of Chorus' revenue.

model and using them to offset later tax liabilities. However, if the Commission is not minded to model tax costs explicitly in its model, then in the alternative it should scale up all asset values in its model by a factor estimated as an appropriate proxy for the existence of early tax losses.

317 We also note that there is an error in Box 1 on Page 146 of the UBA draft determination. The PMT() of the third last formulae is incorrectly expressed. It should state PMT(w-g/(1+g),L,-1) not PMT(w-g,L,-1).

PART FOUR: REPLACEMENT OF INTIAL PRICE (BACKDATING)

318 This Part of our submission responds to the Commission's process and issues update paper for the UCLL and UBA pricing review determinations of 19 December 2014, relating to replacement of the initial prices.

319 The Commission's preliminary view is that it would be likely to best give effect to the section 18 purpose statement by backdating the final FPP prices for UBA, UCLL, SLU, and UCLF to 1 December 2014, but not earlier. We welcome the Commission's preliminary views, which we believe will go some way to enhance certainty and incentives to invest, but think the Commission should go further and backdate the UCLL, SLU and UCLF services to the date of the UCLL IPP determination.

320 We have previously explained our view that backdating is required by the Act – and should, in any event, be adopted by the Commission as a "policy" in all but the most extraordinary circumstances. Our straightforward reading of the Court of Appeal's judgment on backdating in the context of a pricing review determination is the same as the Court of Appeal's own recent description of their earlier judgment in the UBA IPP appeal:[117]

> This Court held in *Telecom New Zealand Ltd v Commerce Commission* CA75/05, 25 May 2006 at [44] that as a matter of statutory interpretation a price review determination relates back to the date of the initial determination.

321 As the Commission correctly identifies, the key reason in favour of backdating a final FPP price is that the FPP price is a correction of the "proxy" IPP price, the FPP price being a more accurate implementation of forward-looking cost-based pricing.

322 As such, backdating, and the industry expectation that backdating will occur:

322.1 enables Chorus to recover its efficient costs of providing the service, and thereby incentivises efficient investment by Chorus;

322.2 incentivises efficient entry and pricing decisions by RSPs prior to the FPP decision being known, as the industry can factor expectations in relation to the FPP price into their decision-making; and

[117] *Chorus v Commerce Commission & Ors* [2014] NZCA 440 at n46.

322.3 ensures that all parties are incentivised to engage in the FPP process in a timely manner, as windfall gains cannot be obtained through delay where parties do not expect the pricing outcome to be in their favour.

323 As we explain below, we believe that these factors support backdating of each of the pricing review determinations for the UBA service and the UCLL, SLU and UCLF services.

The UBA service

324 The Commission has indicated a preliminary view that it will back the final FPP monthly price for the UBA service to 1 December 2014. We support this. There is no justification for not backdating from a date from which the market is aware of the Commission's actual preliminary views on both price and that backdating should occur. Parties are well able to take this information into account in their business planning.

325 Since the publication of the draft determination, a number of RSPs have announced their intention to raise retail prices for broadband services.[118] This announcement appears opportunistic, given there is no evidence that retail prices for these services decreased as a result of either the UCLL or UBA IPP determinations, and the announced price increases extended to retail services that do not use UBA or UCLL services as inputs.

326 Be that as it may, given that some RSPs have raised retail prices and all RSPs have had the opportunity to do so, a failure to backdate now would only result in a windfall to some RSPs.

The UCLL, SLU and UCLF services

327 The Commission has indicated a preliminary view that it will backdate the FPP prices for the UCLL, SLU and UCLF services to 1 December 2014, but not further back to the date of the IPP re-benchmarking decision, that is, 3 December 2012.

328 We agree that FPP prices for these services should be backdated at least to 1 December 2014, but think that backdating to the date of the re-benchmarking decision is both mandated by the Act and preferable from a policy perspective.

329 As we have explained, an expectation of backdating promotes efficient investment and pricing by the industry. In particular, if the FPP price is not backdated, this will inevitably mean that Chorus does not recover the efficient costs of providing the service for this period. The Commission's preliminary view for the UCLL, SLU and UCLF services means that, if the prices in the draft determination are confirmed, a shortfall between the IPP price and the efficient price will be imposed on Chorus for a period of nearly two years.

330 In the case of the UCLF service, the extent of that shortfall between the price paid by RSPs and the efficient price is itself the result of a separate decision by the

[118] Spark "Spark changes pricing to reflect Chorus wholesale copper line costs (press release, 10 December 2014), available at http://www.sparknz.co.nz/news/pricingwholesale/; Vodafone "Important changes to Broadband and home phone plans" (press release, undated) available at http://www.vodafone.co.nz/pricechanges/.

Commission on 24 April 2014 to backdate the UCLF connection charges to 3 December 2012.[119] Chorus was required to pay interest on the amount backdated. Yet, having now determined that the revised UCLF price was inefficient, the Commission's preliminary determination is not to backdate the efficient price so as to reverse the effects of its earlier determination.

331 From the outset of this process, Chorus has been open about both its expectation that the FPP price for the UCLL service would rise from the re-benchmarked price and its view that backdating should occur.[120] RSPs were aware of the Court of Appeal decision and other precedent supporting backdating. RSPs were also well able to take a realistic view themselves as to the likely relationship of the benchmarked price to the FPP price into account in their decision-making, most easily by having regard to relevant market commentary.[121]

332 As discussed above, there is no evidence that consumers have benefited even in the short term from lower prices as a result of the UCLL IPP re-benchmarking determination (or an expectation of an inefficiently low UBA price from 1 December 2015).

333 This is not a criticism of RSPs. To the contrary, it is an example of the process working as it should: inefficiently low retail prices are not set due to prudent business practices in which RSPs take into account the likelihood of backdating and the outcome of the pricing review determination. Such prudent business practices are only incentivised in the future, however, if backdating occurs now.

334 The Commission has rightly expressed a concern that delays in the pricing review determination process ought not to affect incentives to invest. But this is exactly what the Commission's preliminary decision will do. It also sends a message to the industry, and investors, that delay (and in this case very significant delay) of processes which are expected to produce unfavourable outcomes can create material benefits. The Commission should think carefully before reaching such a conclusion.

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[119] Commerce Commission, "Review of the Standard Terms Determination for Chorus' Unbundled Copper Low Frequency Service under section 30R of the Telecommunications Act 2001" [2014] NZCC 9 at [76].

[120] Chorus "Chorus takes next steps in copper pricing review" (2 December 2013) "*Completing the FPP processes for UCLL and UBA could well mean that we take another two years to end up rebalancing at around the same aggregate price … There is also precedent for the revised prices from the FPP to be backdated*"; Chorus, public letter to shareholders (11 December 2013) "*[W]e do believe that a credible review when completed could mean that for the combination of services regulated by the Commission, Chorus could charge prices around or even above current levels, significantly above the results from the Commission's initial benchmarking approach".*

[121] CIMB (20 November 2013) "*Modelling the copper access network (i.e. the FPP process) would likely reveal a significantly higher network cost … We think building a cost model under an FPP approach would lead to an aggregate price close to current levels*."; Credit Suisse (4 December 2013) "*We believe there is a good chance the Comcom's final pricing principle (FPP) delivers a higher UCLL price than the benchmarked outcome under the initial pricing principle*"; Credit Suisse (16 December 2013) "*We continue to believe this process will highlight that the implied regulatory asset base for CNU under the initial pricing principle is too low and as such under the FPP process it will result in a higher price for copper based services*"; Forsyth Barr (16 December 2013) "*…We expect the combined UCLL + UBA price to be around $41.50*"; Forsyth Barr (24 February 2014) "*We remain of the view that … the UCLL review is the critical one … There may be a significant difference in the pricing set under a cost-based review of UCLL and its current level of $23.52*"; UBS (24 February 2014) "*We believe it likely that CNU receives a better copper pricing through one of the ComCom's FPP processes*".

Relevance of UBA price freeze

335 In making its preliminary assessment, the Commission has placed weight on the freeze of UBA prices to 1 December 2014 to protect retail service providers' recovery of their investment in unbundling. We do not think that backdating the UCLL, SLU and UCLF prices will materially affect this purpose, but also do not think that in the circumstances it justifies a departure from the policy reasons supporting backdating of the efficient TSLRIC price for the UCLL service.

336 The Commission's approach to backdating should be principled and capable of reciprocal application. In the case of the weight placed on protecting investment in unbundling, this appears to be a factor that can only be relevant where the FPP price is higher than the IPP price: if it were lower, then recovery of investment in DSLAMs by unbundlers would not be placed at risk. This means that availability of backdating is one-sided – it depends on whether it has resulted in over- or under-charging of the efficient price.

337 In Chorus' view this is wrong in principle. The efficiency of backdating ought not to depend on which party will receive the "benefit" of it: the point is that it is consumers who benefit in the long run from backdating, through the efficient investment and price signals that the expectation and practice of backdating creates.

338 While freezing the prices for the UBA service until 1 December 2014, Parliament deliberately did not freeze the prices for the UCLL service. The Parliamentary expectation must be taken that an efficient price for the UCLL service – including a backdated FPP price, if any - should apply prior to 1 December 2014.

339 Accordingly, the protection to be afforded to recovery of existing (i.e. sunk) investment in unbundling was significant, but *partial* only. Recovery of the investment was promoted by maintaining the Chorus retail-minus UBA price – and, through this, effectively the retail broadband price - at previously expected levels for a three year period after separation. This ensured both expected revenues to unbundlers, and ensured that unbundlers would not be put at a competitive disadvantage compared with the RSPs using the UBA service. At the same time, as the UCLL price was not frozen, unbundlers remained exposed to changes in the UCLL price (whether as a result of re-benchmarking an IPP price or a pricing review determination).[122]

340 The result of the Commission's proposed approach, in undertaking IPP re-benchmarking of the UCLL price, backdating the IPP price for the UCLF service, but then not backdating the FPP price for either the UCLL service or the UCLF service, is stark.

[122] We also do not think that adjusting the UCLL price for the period prior to 1 December while not doing the same for the UBA price will necessarily have a negative effect on unbundlers. On the Commission's draft FPP determinations, the margin between the UCLL and UBA price ($10.17) is lower than between either the UCLL and UBA IPP determinations ($10.92) or between the UCLL FPP determination and the UBA IPP determination ($17.70). So, if both the UCLL and UBA FPP price were able to be backdated beyond 1 December 2014, the result would be worse for unbundlers than is the case.

341 The pricing review determination for UCLL arises because of the Commission's election to re-benchmark UCLL IPP prices in December 2012. The IPP re-benchmarking process must have proceeded with an open mind as to whether prices would rise or fall (and there is nothing in the Commission's determination to indicate that it did not). Yet, any price rise as a result of the Commission's IPP re-benchmarking would have faced the same objection that the Commission now identifies to backdating the FPP price: that it was undercutting expected recovery of investment in unbundling. Any concern that this was contrary to legislative policy should have been considered then – by not undertaking the IPP re-benchmarking exercise - rather than now when considering backdating of the FPP price.

342 As a result of the IPP re-benchmarking determination, the UCLL price (and UCLF price) was reduced by approximately 3.85%. But, on the Commission's draft FPP determination, the efficient TSLIRIC based price is higher than the original benchmarked price. The result of the IPP re-benchmarking decision is therefore that since 3 December 2012 Chorus has been required to provide the UCLL service at an even less efficient price, and under-recovered an efficient level of costs to an even greater extent, than would have been the case absent the benchmarking determination.

343 Yet, the Commission now says that it ought not to backdate the now-determined efficient FPP price for this period because it is higher than the original IPP benchmarked price.

344 Put another way, on the Commission's preliminary approach, the Commission's re-benchmarking will operate as a "one-way ratchet". It has resulted in greater recovery for unbundlers than was required by the Act's limitation on review of the UBA price, and despite that additional recovery now being demonstrated to be inefficient, it cannot be reversed even to the previous IPP levels.

345 Such a result is not required by the Act, is inconsistent with the long-term benefit of end-users in predictable regulation that promotes efficient investment, and is inconsistent with good regulatory policy.

The impact of backdating / practical implementation

346 The Commission has indicated that it intends to forecast the impact of potential backdating on RSPs, and consider this when making its final decision and whether there are mechanisms that could mitigate any impact if there is a risk that some firms may exit the market.

347 We agree that a forecast of the impact of potential backdating may be a useful exercise for the Commission to undertake in the context of implementing backdating, but it is not relevant to whether backdating should occur. The Commission's focus must be on the effects of backdating on competition for the benefit of long term end-users, not on individual companies.

348 In addition, any consideration of the position of individual companies will require an assessment of any broader reasons for any financial difficulties, and in particular whether the company has acted efficiently and prudently in its business planning. Given this, we think that there is risk that individual forecasts may end

up a distraction to the Commission, requiring significant work and causing much debate without casting material light on the ultimate questions.

349 Instead, we think that a focus on mechanisms which mitigate the impacts of repayments on parties is likely to be more important. There is no good reason for any party who has otherwise prudently managed its business to consider market exit as a result of backdating. Mechanisms which mitigate the impacts of repayments are common in the commercial world, are straightforward to apply and administer, and can be structured for both small and large customers and repayments.

350 We have previously indicated that we will offer our customers commercial options for implementing backdating with minimal impacts on our businesses. Chorus will offer a repayment scheme based on the credit worthiness of the RSP. The repayment scheme will be at a fixed rate of interest and the repayment term will be agreed with each RSP. This will help RSPs to manage the impact of backdating through reasonable payment options. We will work with individual customers to shape the term based on the option that suits their needs best.

PART FIVE: REGULATORY PROCESS AND STABILITY

Timetable

351 The draft determination represents a significant milestone in the Commission's process to determine TSLRIC prices for the services, commenced over two years ago.

352 We have previously signalled our concern with the length of this process and the uncertainty for Chorus and the wider industry it has generated. While we recognise that the Commission's task is complex, and that backdating may in part address some of the concerns with timetabling delays (although not in the case of the UCLL service, on the Commission's preliminary approach), in our view it is essential that the Commission now proceed to complete the process as soon as reasonably practicable, and by September 2015 at the latest.

353 The Commission has already undertaken extensive public consultation at multiple stages of the process, and will do so again in respect of the further draft determinations. There is no obligation on the Commission to hold a conference after the draft determination. However, the Commission has indicated that it expects to hold (and we welcome) a conference on the critical issue of the monthly charges in April.

354 The remaining steps in the Commission's proposed process provide a robust consultation on all outstanding issues. Overall, the nearly 2 ½ year process will involve consultation far more extensive than provided for in the Act.

Regulatory period

355 Given the length of the current process, Chorus maintains its position that a 10 year regulatory period or, as a compromise, even 7 years, together with the period to which the determination is backdated is preferable to provide regulatory predictability.

356 Price setting has had a destabilising effect on both Chorus and the wider industry, and so we prefer a reasonable period of price stability to focus on the rollout of and migration to UFB. A longer period would maximise certainty for Chorus and its customers while the Government review of the legislative process takes place.

357 Given the length of the present process (scheduled to take over 2 ½ years), we think it is unrealistic to assume that a process commenced in 2019 could be completed prior to the initial five year regulatory period expiring. But, if it is required to commence work earlier on the next regulatory period, the Commission will not have the expected benefits of the Government's review of the Act and roll-out of fibre to deliver ultra-fast broadband.

Appendices

APPENDIX A: FUNCTIONALITY OF THE UCLL AND SLU SERVICES

The full functionality of the service

358 The correct position under the Act to the modelling of the service remains the Commission's original view, set out in its December 2013 UCLL process and issues paper, that it is required to model a network that "*at a minimum, should provide the same functionality as the existing UCLL service*".[123]

359 The Act requires the Commission to model "*the facilities and functions that are directly attributable … to the service*".[124] The network modelled by the Commission should therefore be capable of delivering the full functionality of the UCLL STD service.[125] This is an orthodox application of TSLRIC. The Commission's reasons for departing from this approach remain essentially as set out in its subsequent papers and we have previously explained why we disagree in our previous submissions. [126]

Consistency of modelling "full functionality" with TSLRIC objectives

360 We do make two additional points on this issue by reference to the Commission's revised discussion of the objectives of TSLRIC in its draft determination - providing greater regulatory predictability and promoting efficient investment - with which we agree.

Core functionality introduces unpredictability into TSLRIC exercise

361 First, the Commission's preferred approach to selection of the MEA introduces a significant element of subjectivity, in relation to the assessment of what constitutes the "*core functionality*" of the service, into the TSLRIC exercise.

362 The Commission has not specified in its draft determination any objective criterion that would enable the identification of what service functionality is "*core*", and which is not. This means that there can be serious disagreements about what aspects of the functionality of the service are "core", and which aspects are not.

363 For example, if the Commission's "*core functionality*" approach is adopted, our view is that the core functionality of the service must include at a minimum the functionality to make the service consistent with the service description in

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[123] Commerce Commission "Process and issues paper for UCLL FPP" (6 December 2013) at [96].

[124] Telecommunications Act 2001, Schedule 1, cl 1.

[125] Analysys Mason "Report for Chorus: Response to Commission" (14 February 2014) at [1.4.3]; Analysys Mason "Paper on framework and modelling approach" (6 August 2014) at [1.4].

[126] Chorus "Submission on UCLL FPP process and issues paper" (14 February 2014) at [59]-[64]; Chorus "Cross-submission on Process and Issues paper for UCLL FPP" (28 February 2014) at [20]; Chorus "Submission in response to the Commerce Commission's Further consultation on issues relating to determining a price for Chorus' UCLL and UBA services under the final pricing principle" (11 April 2014) at [58], [80]; Chorus "Submission on Commission's framework and modelling approach" (6 August 2014) at [247].

The Commission's discussion of this issue in the draft determination appears to misunderstand Chorus' position expressed in those submissions. The Commission paraphrases Chorus as arguing that the Commission must model a service that focuses heavily on the functionality and technology of its existing network. That is not the case. As set out in detail in our previous submissions, we are not saying that the Commission is constrained by Chorus' existing network. Instead, our position is that the Act requires the Commission to determine the TSLRIC costs of the STD service which is purchased by RSPs and relied upon by New Zealand consumers and markets. Our position does not constrain the Commission either to selecting a MEA technology that is the same as Chorus' existing network, or as to the extent of optimisation of the network. Chorus "Submission on Commission's framework and modelling approach" (6 August 2014) at [231]-[237].

Schedule 1 of the Act. The core functionality of the UCLL and SLU services must therefore include their ability to be unbundled at Layer 1. We explain this position further, below.

364 The very fact that there can be a dispute on an issue as fundamental as whether the ability to unbundle the local loop (for a service called "Unbundled Copper Local Loop") is a core functionality of that service, and what the relevant criteria are for resolving this dispute, means that the concept of "*core functionality*" does not promote, and in fact undermines, a predictable application of TSLRIC. This is inconsistent with the Commission's correctly stated objectives for the price review determination exercise.

Unfunded functionality

365 Second, the Commission's approach means that Chorus may be required to provide unfunded functionality to the extent that the full functionality of the service it presently provides is more extensive, and therefore has a greater cost, than the "core functionality" for which it is able to charge.

366 We acknowledge that it is not clear that the Commission intends this outcome, but that is the consequence of the Commission's approach.

367 If Chorus is obliged to provide non-core functionality, then the Commission's approach will mean that Chorus is obligated to maintain and replace network to deliver the "non-core" functionality, despite receiving no compensation for the additional costs of doing so. This is inconsistent with the Commission's view, with which we agree, that TSLRIC can be expected to provide for the upkeep of the network and required expansion.

The "core functionality" of the UCLL and SLU service

368 If the concept of "*core functionality*" of the service is appropriate to use to select a MEA, then the core functionality of the service must be correctly defined.

369 The ability for the service to be unbundled represents the most basic functionality of Chorus' *Unbundled* Copper Local Loop Network service. The Act describes the UCLL service as *"a service (and its associated functions, including the associated functions of operational support systems) that enables access to, and interconnection with, Chorus' copper local loop network (including any relevant line in Chorus' local telephone exchange or distribution cabinet)"*.[127]

370 The core functionality of the service is therefore best described as a physical connection providing a point-to-point transmission *medium* between the end-user and a hand-over point which enables RSPs to utilise their own equipment to provide a voice and data communications service to end-users.

371 In contrast, the "core functionality" of the UCLL service is defined in the draft determination as a service which allows "*an RSP to provide voice services and broadband services to end-users. That is, the service must allow end-users to send and receive traffic*".[128] This omits a critical dimension of the functionality of the service: namely, the layer at which it is provided.

[127] Telecommunications Act, Schedule 1.

[128] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [278].

Approach to determining "core functionality" of a service

372 In assessing what functionality of the UCLL service is to be regarded as "core", the language and structure of the Act must be paramount. That is, the question of what functionality is core must be answered, in substantial part, as a matter of interpretation of the definition of the relevant service in Schedule 1 of the Act.

373 While the draft determination is largely silent on how the "core functionality" of the service is to be determined, we do not understand there to be any difference between our proposed approach and the advice provided to the Commission by Dr James Every-Palmer.

374 Dr Every-Palmer describes the process of abstraction to distil the "core functionality" of the service as "*determining the efficient cost today of an equivalent service unconstrained by the historic technology choices of Chorus (or of end-users)*".[129] Dr Every-Palmer goes on to state the process of abstracting from the service delivered to the "core functionality" of the service should be technology neutral,[130] and that the relevant question is "*what sort of comparable service would be provided today?*"[131]

375 Put another way, the central concern of Dr Every-Palmer's opinion is the extent to which the service for which an MEA is to be selected is constrained by the characteristics of the service derived from the technology deployed in Chorus' network. Dr Every-Palmer's opinion does not provide support for an abstraction away from the functionality of the service that is mandated by the Act.

The statutory language and structure

376 The language and structure of the Act is consistent with the core functionality of the UCLL service including that it is able to be unbundled at Layer 1.

377 A characterisation of the "core functionality" of the UCLL service that does not incorporate the ability for the service to be unbundled does not distinguish the level at which the service is provided. In theory, this would allow the Commission to model and price the UCLL service entirely on the basis of a Layer 2 (or Layer 3) MEA, if found to be the most efficient technology to provide a voice and data service.[132]

378 Such an approach is inconsistent with the careful distinction between Layer 1, Layer 2 and wholesale services in the Act, and the Commission's designated task, which is to price each service separately. The differentiation between Layer 1 and 2 (and wholesale) services in the Schedule makes clear that one cannot be substituted for the other. For example:

378.1 Schedule 1 of the Act carefully differentiates between services at different levels of the value chain in providing retail voice and broadband services, and requires the Commission to price each service (to extent an STD is determined in respect of that service) separately. The designated services include:

[129] James Every-Palmer "Service description and MEA paper" (12 March 2014) at [4].

[130] James Every-Palmer "Service description and MEA paper" (12 March 2014)at [13(d)].

[131] James Every-Palmer "Service description and MEA paper" (12 March 2014) at [14].

[132] Indeed, given the general efficiencies of vertical integration, it is almost certain that an HEO would select to wholesale retail POTS plus UBA services.

(a) Chorus' UCLL and UCLF services;

(b) Chorus' UBA service and Spark's POTS service; and

(c) Spark's wholesale telecommunications services (including both retail POTS and broadband services).

378.2 the Act expressly requires the Commission to consider the relativity between the UBA and UCLL services. Relativity is a relevant statutory objective purely because UCLL is the unbundled, and UBA the bundled service.[133]

378.3 the purpose of the staggered range of access services in Schedule 1 of the Act is to enable an RSP to pick and choose between access services, [134] and decide whether to build – i.e., to invest in component network equipment (e.g. Data switches, DSLAMs or PSTN switches) or purchase services from Chorus or Spark.

379 The importance of the distinction between the UBA and UCLL service is supported by the history of amendments to the Act. The UCLL service was introduced as a designated access service as an addition to UBA to provide a lower layer for competition.[135] It is inconsistent with that history and statutory purpose of facilitating unbundling to describe the functionality of the UCLL service in a way that does not distinguish between the statutory UCLL and UBA service. The relevant distinction is the layer which the service is provided: i.e., the ability of the UCLL service to enable RSPs to derive a bitstream service (or a voice service) using their own equipment and to compete with Chorus' UBA service.

380 Put another way, the layer at which the service can be used goes directly to the economic rationale for unbundling of Chorus' copper local loop in addition to providing bitstream access. Unbundling of UCLL is important to encourage the types of competition that the regulation of UCLL in addition to UBA was designed to promote.

International precedent

381 International definitions of UCLL and ULL also indicate that unbundling, or access to the copper pair, is regarded as the fundamental characteristic of the Layer 1 access service. This is significant, as the legislative history of the amendments to the Act introducing the UCLL service indicate that it was understood that the Act was introducing a well understood service that was consistent with other jurisdictions.[136] This expectation explains, amongst other things, the view that the IPP for the UCLL service could be set by benchmarking.

[133] Telecommunications Act, Schedule 1.

[134] See also James Every-Palmer "Service description and MEA paper" (12 March 2014) at [26].

[135] See for example (12 December 2006) 636 NZPD 7130.

[136] See for example (12 December 2006) 939 NZPD 7155 *"New Zealand along with … Mexico were about the only two countries in the OECD that had not unbundled the local loop"*

382 The following definitions of ULL all emphasise that the connection is to the access or physical layer of the network:[137]

382.1 *The Cable and Telecommunications Professional's Reference* defines local loop unbundling as occurring "*when a telecommunications undertaking makes its local access connections available, that is its "copper loops", on a wholesale basis to other network operators or services providers, who use them to create a retail customer service.*"[138]

382.2 The *Dictionary of Information Science and Technology* defines local loop unbundling as "*the regulatory process of allowing multiple telecommunications operators the use of connections from the telephone exchange's central office to the customer's premises (the local loop).*"[139]

382.3 *Telecommunications Regulation* defines local loop unbundling as "*the making available by a telecommunications operator of its physical customer access connections for use by other operators or service providers.*"[140]

382.4 An OECD Glossary defines ULL as "*the provision of access to both ends of the copper local loop on a permanent basis, allowing the installation of equipment for upgrading the local loop to provide DSL services or the lease of any such equipment which is already installed*".[141]

383 The reference to the "*physical*" component of the network, or "*local loops*", is consistent both with the service description in the Act for UCLL and with the proposition that central to the functionality to be offered is the ability to unbundle at the physical layer. This is made express in the OECD Glossary definition, which requires the service to allow the installation of equipment for upgrading the local loop to provide DSL service (i.e., in New Zealand, the UCLL service) as well as (or) the lease of DSL equipment already installed (in New Zealand, the UBA service).

384 Consistent with this, Analysys Mason has indicated that unbundling is a fundamental characteristic of Chorus' copper local loop network that must be available from the MEA.[142]

[137] See also Harry Newton *Newtown's Telecom Dictionary* (17th ed, Flatiron Publishing, New York, 2013) at 720-722; Maurice Gagnaire *Broadband Local Loops for High-Speed Internet Access* (Artech House, MA, 2003) at 51.

[138] Goff Hill (ed) *The Cable and Telecommunications Professional's Reference*: PSTN, IP and Cellular Networks, and Mathematical techniques (Focal Press, United States, 2007) at 29.

[139] Mehdi Khosrowpour (ed) *Dictionary of Information Science and Technology* (2nd ed, Information Science Reference, United States) at 568.

[140] John Buckley *Telecommunications Regulation* (2003, Institution of Engineering and Technology, London) at 157.

[141] OECD Stat Extracts "Glossary of Statistical Terms", 13 July 2005. http://stats.oecd.org/glossary/detail.asp?ID=6760

[142] Analysys Mason "Response to Commission" (12 February 2014) at 15; Analysys Mason "Paper on framework and modelling approach" (6 August 2014) at [1.5].

The Commission's advice

385 Finally, the inclusion of the ability to unbundle as part of the core functionality of the UCLL service does not require departure from the process of abstraction described by Dr Every-Palmer in his advice:

385.1 the requirement that RSPs be able to use the UCLL service to compete with the UBA service by unbundling is not determined by any historic technology choice of Chorus, but rather the statutory structure;

385.2 the requirement that RSPs be able to use the UCLL service to compete with the UBA service by unbundling is technology neutral (i.e., it does not require a functionality associated with only one type of technology);

385.3 it is consistent with the question "*what sort of comparable service would be provided today?*", given that whether the service is 'comparable' must necessarily be informed by the essential features of the statutory service description.

386 To the contrary, that the core functionality of the service includes its ability to be unbundled at a particular level appears to be entirely consistent with Dr Every-Palmer's advice. Dr Every-Palmer identifies as a relevant consideration and constraint "*the staggered nature of the designated access services*.[143] Dr Every-Palmer's preliminary advice is therefore that the UBA MEA must take the Chorus copper local loop network as a given precisely to ensure relativity in relation to build/buy decisions by RSPs.[144]

387 However, the "*staggered nature of the designated access services*" must also act as a constraint on the choice of UCLL MEA. Put another way, the "*comparable*" or "*equivalent*" service that would be provided today to Chorus' UCLL service must be a Layer 1 service that enables RSPs to derive a bitstream service (or a voice service) using their own equipment and to compete with Chorus' UBA service.

[143] James Every-Palmer "Service description and MEA paper" (12 March 2014) at [6(b)].

[144] James Every-Palmer "Service description and MEA paper" (12 March 2014) at [29].

APPENDIX B: IMPLEMENTATION OF TSO CAPITAL CONTRIBUTIONS

388 The implementation of Commission's approach should be corrected by:

388.1 ensuring that the TSO boundaries derived by the Commission are accurate. Chorus has corrected the geo-coding of connections data for 2001 used for the Commission's TSO determinations;

388.2 ensuring that capital costs associated with route lengths and assets required to serve premises within the TSO boundaries derived by the Commission are not being excluded by the Commission's methodology; and

388.3 treating any assumed capital contributions as a one-off payment received by Chorus for network deployment for the first deployment of the relevant assets, but not any subsequent replacement of the asset. This can be implemented by assuming a very long lifetime for the capital contribution such that its effects are spread smoothly over the service lifetime, and not just the first asset lifetime.

389 In this Appendix we discuss each of these issues in turn, in more detail.

Accuracy of TSO boundaries

390 The Commission should review the polygons used to define the boundary of TSO areas for accuracy. Currently, areas of network known to exist as at December 2001 are being excluded.

391 The Commission has used base data to construct its polygons with which there are known issues. In the first TSO determination,[145] the Commission noted that it had an exact address match for only 70% of end-user locations, with the remaining locations being located only to a street or suburb.

392 We understand the Commission has done more work on this data set, but this is not described in its draft determination. However, it cannot have achieved material improvements in accuracy as numerous examples remain of premises that had telecommunications services in 2001 that are excluded from the Commission polygons. We have referred to the example of Canterbury in Part Two of this submission.

393 Outside of the Canterbury region, the Commission's modelling generates similar anomalous results. For example, the following buildings are outside the Commission's derived polygons:

393.1 the Auckland War Museum, constructed circa 1929 (see Figure B1, below);

393.2 residential buildings in well-established streets such as King Street, Kingsland Auckland (compare Figures B2 and B3, below).

[145] Commerce Commission "TSO Final Determination 2001/02" (December 2003), Appendix 15.

Figure B1: TSO 2001 Polygon areas in green, Auckland War Memorial is located in the light blue area in the centre, not in a polygon.

Figure B2: King Street villas in Kingsland, a well-established suburb since 1900.[146]

Figure B3: TERA TSO 2001 Polygon areas in green, King Street villas as grey dots missed out of the polygons.

[146]: For more information refer to http://www.kingslandnz.com/visiting-kingsland/history-heritage.

394 A more accurate approach is available to the Commission. Chorus has located a file that contains connections data created in 18 December 2001 which we believe was used in the Commission's TSO determination modelling. While that file does not contain geo-code data for all properties, each property is given a unique connection ID (**SAM ID**).

395 The SAM ID can be used together with Chorus' current network database to identify the precise geo-co-ordinates of all end-users in December 2001. This approach is preferable as improvements of geo-coding of premises in Chorus' records has improved significantly since 2001 and, in particular, Chorus now uses CoreLogic to geo-code end-user premises. It is therefore possible, given the SAM IDs provided by the December 2001, to provide much more accurate geo-coding of these premises than was available to either Chorus or the Commission in 2001. Chorus has, in conjunction with external consultants, undertaken this analysis and will provide the corrected data set to the Commission with this submission.

396 The Commission should redraw its TSO polygons to ensure that all end-users in December 2001 with specific geographic co-ordinates in the corrected data set are included within the polygons.

397 As a cross-check, the Commission should also model the actual route lengths required to serve these end-users and compare it with the route length required to serve all demand in 2014. Logically, the route length to be excluded as not required to serve demand in the TSO areas should be less than the difference between the route lengths required to serve specific end-users in 2001 and 2014.

All capital costs associated with serving demand within TSO boundaries should be included

398 The capital costs associated with all assets used to serve demand within TSO boundaries should be included, even if those assets are not themselves included within the TSO boundaries.

399 Analysys Mason has investigated the way in which the TSO boundaries have been implemented by TERA.[147] It has identified that, as presently implemented, the methodology appears to exclude assets which fall outside the "islands" of the Commission's geographic polygons derived to indicate end-user locations in December 2001 even if those assets are used to serve those end-user locations (essentially, by connecting the "islands" to the network).

400 Analysys Mason has identified 46 exchange locations (or 6.4% of the total number of exchange locations in Chorus' network) which appear to be outside the Commission's TSO boundaries. These include exchanges in rural ESAs but also include certain urban exchanges. By definition, network would be required to be deployed to connect demand in the TSO boundaries within these exchange areas to the exchanges, but it appears that the Commission model excludes the cost of this network to the extent that it does not itself fall within the TSO boundaries.

401 The Commission's approach is that an HEO would connect premises within the TSO boundaries without seeking a capital contribution. This must logically extend to all networks required to serve those premises, including necessarily all routes required to connect the premises to the exchange. Accordingly, assets that would

[147] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.1].

be deployed to serve demand in regions served in December 2001 are being wrongly excluded in the way the Commission's approach is being implemented in the Commission model.

402 The Analysys Mason report explains how this issue can be addressed using the existing algorithms of the Commission's model. Analysys Mason has analysed the impact of the exclusions, and reports that, if corrected, approximately 10,000 km of route length would no longer have their capital costs excluded from the model even on the use of the Commission's current polygons.

Capital contributions should be implemented as one-off payments

403 Any capital contributions should be implemented as a one-off payment rather than assuming that the HEO will receive further contributions to fund replacement assets.

404 The Commission has implemented its assumed capital contributions by removing assets funded from the contribution from the asset base, thus reducing the capital spending in the tilted annuity. The effect of this implementation is that the HEO is assumed to have received a capital contribution to fund the building or purchase of the assets *and* that the HEO receives no depreciation allowance on those assets that would enable it to replace the assets funded by the capital contribution.

405 The Commission's approach can be justified only by an assumption that the end-user will fund not only the initial deployment of the asset, but also any subsequent necessary replacement. We do not think this assumption can be justified even on the Commission's HEO approach.

406 First, the assumption is contrary to Chorus' obligations under the UCLL STD, which requires it to provide the UCLL service while an end-user is connected to its network (and therefore, implicitly, replace all assets required to provide the service to the end-user). This obligation means that Chorus – and the HEO - cannot compel end-users connected to its network to make capital contributions to fund replacement assets required to continue to deliver the service. Instead, it must recover the costs of replacing network from the monthly charges.

407 Second, this approach is contrary to the Commission's stated objective that TSLRIC should provide for the upkeep of the network and equipment and any required expansion across Chorus' actual network. If the HEO is not entitled to recover the costs of depreciating the assets which it owns, it will not be able to replace those assets at the end of their life. The effect is that the Commission's approach will undercompensate even the level at which an HEO can upkeep the required network and equipment.

408 This issue can be addressed by treating any capital contributions as a one-off payment is to treat it as an asset with a negative capital cost and its own lifetime (Analysys Mason suggest a minimum of 20 years).[148]

[148] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.2].

APPENDIX C: TRENCHING AND REINSTATEMENT COSTS

Introduction

409 The Commission's cost model must be grounded in reality. That is particularly applicable to assumptions around the trenching costs which an HEO would incur. Trenching costs are one of the primary cost drivers of a fixed access network. Reinstatement and traffic management in particular can have a substantial impact on costs, so there is variance across different local government requirements and particularly urban areas. In particular Auckland and Wellington can be very high cost.

410 In this appendix, we elaborate on why Beca's trenching cost estimates are incorrect and how they should be amended. We also give some indicative examples from our extensive UFB experience with trenching and reinstatement works.

The available information

411 While we agree with the Commission's conclusion that trenching costs should not be benchmarked, we do not support the use of the Beca rates to derive trenching costs. Rather, the Commission's determination of trenching costs should be based on the best available evidence which reflects the costs of trenching in the New Zealand environment and reflects the characteristics of the particular geographic areas to be deployed. That evidence is Chorus' UFB and RBI trenching rates as adopted in the Analysys Mason model provided to the Commission, for the reasons we describe below.

412 Chorus' UFB build cost data was not provided to Beca,[149] which significantly diminishes the likely accuracy of their estimation. Beca instead utilised indicative quotes from contractors, which were estimated average, cover-all rates under a Beca approach which involved a "minimum time commitment" from the contractor.[150] Not all contractors approached by Beca were willing to supply indicative estimates, because:[151]

412.1 a number of the larger firms were tired of consultants ringing them up for pricing information;

412.2 some firms had been asked to account when tendered rates were higher than indicative rates; and

412.3 some firmly believed that each job should be priced individually.

413 In contrast, while Analysys Mason calculated a blended average trench unit cost by CSA, it was based on Chorus' marketplace cost information. Chorus' UFB and RBI build costs information is:

[149] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), page 3 *("Beca has produced this report as an independent consultant without any technical or costing input from the Commission…")*.

[150] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), page 11.

[151] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), page 11.

413.1 based on highly disaggregated data, and so reflects the full spectrum of terrain types, local authority rules, and cost characteristics of the various ESAs;

413.2 recent, reflecting transactions in the last two years for UFB and RBI programme costings, which are based on prices reached in the open market in ESAs in which Chorus is present; and

413.3 reflective of a large scale network rollout over a short time and the economies of scale inherent in a large build.[152] Beca's estimates specifically exclude consideration of such efficiencies.[153]

414 Analysys Mason used actual trenching cost data from Chorus' ongoing UFB and RBI build to derive a blended average trenching cost. Although it is conducting UFB and RBI works around New Zealand, Chorus does not hold actual trenching costs data for every New Zealand ESA because it has not commenced work in some areas, and in other areas (e.g. Northland) it was not appointed as an LFC. Analysys Mason therefore selected 130 ESAs in which Chorus held sufficient UFB/RBI cost data.

415 For each ESA, Analysys Mason identified candidate drivers for different types of civil costs (including digging/drilling, reinstatement, traffic management) based on the mix of density (clutter types), underlying rock types and road types present in each ESA. This enabled it to derive a blended average unit cost for trenching per meter in that ESA.

416 Analysys Mason then compared that blended unit cost against Beca's findings for the applicable ESA.[154] It found that:

416.1 the outputs of Beca's analysis are considerably lower than Chorus' actual costs in that ESA in the vast majority of ESAs analysed; and

416.2 in practice there is considerable variability in the unit costs per ESA, but Beca's cost calculations are almost the same for most ESAs.

417 These differences are particularly pronounced for urban ESAs, and in particular for Auckland and Wellington which are very high cost. Beca did not have actual cost information for either of these regions and instead extrapolated from estimates and limited data from other regions (Horowhenua and Kapiti). In Chorus' experience, and as Analysys Mason's findings show, Auckland costs lie far beyond the ESA average rates in other parts of New Zealand, primarily as a result of underground service congestion, rock type and traffic management factors. For example:

[152] While UFB rates reflect economies of scale, Chorus has been obliged to sequence its roll-out as directed by CFH and deploy soonest in high priority areas. This has deprived Chorus of some of the efficiency benefits and cost reductions which could otherwise have been obtained in carefully sequencing deployment areas. However, Chorus considers that its net global trenching rate is largely unaffected by the CFH directions.

[153] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), page 9.

[154] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [3.3].

417.1 Chorus' actual UFB trenching costs (including traffic management and reinstatement) for years 3 and 4 deployment in the Auckland region are on, on average, **[CI:]** – about **[CI:]** *times* more expensive than the $56.30/m average cost estimated by Beca for Auckland areas; and

417.2 Chorus' UFB trenching costs (again, including traffic management and reinstatement) for years 3 and 4 deployment in the Auckland CBD area are on, on average, **[CI:]** – about **[CI:]** *times* more expensive than $56.30/m average cost estimated by Beca applicable to the Auckland CBD.

418 Service congestion in the underground corridor and traffic management are also major cost drivers when trenching in other urban centres. Again, Beca's estimated rates do not appear to appropriately capture the likely extent of these costs or the degree of variability. For example, in central city areas of Kapiti and Horowhenua (including downtown Levin), Chorus' actual UFB trenching costs (including traffic management and reinstatement) for years 3 and 4 deployment are around **[CI:]** – about **[CI:]** times higher than the $40.40 average cost estimated by Beca for those locations.

Aurecon review of Beca report

419 We retained expert construction consultants Aurecon, to comment on Beca's trenching cost estimation methodology – that report is provided with this submission.[155]

420 Aurecon is one of the world's leading engineering, management and technical services consultancies. It has significant experience in complex, large scale construction and major data and telecommunications projects. Aurecon has been present in New Zealand since 1992 from which it works on numerous large scale local authority and infrastructure upgrade projects (including, at present, Chorus' UFB build).

421 Aurecon reviewed the Beca report and identified a number of cost components which may not have been correctly assessed, when regard is had to Chorus' trenching costs from its UFB and RBI roll-out (which are likely to be the best available evidence of trenching and reinstatement costs). The main conclusions of Aurecon's report are:

421.1 while soil classification impacts trenching rates, in Aurecon's experience there are far greater variables which impact productivity rates, such as unmarked services which may be struck or require relocation. Trenching in a built up environment is always considerably more costly than in a wide open berm;

421.2 Beca's estimates for consenting costs are derived solely from Kapiti and Horowhenua data, on the basis that, due to the conceptual nature of the estimate, there is likely to be "negligible" differences between those two regions and the rest of New Zealand.[156] Aurecon considers that Beca's

[155] Aurecon "Review of FPP Corridor Cost Analysis" (10 February 2015).

[156] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014) at page 7.

comments "miss the complexity" of the UFB approvals process, which requires packages to be presented for approval well in advance of physical works commencing. In Aurecon's experience, it is not possible to expect that consenting costs for Kapiti and Horowhenua could be applied in a city or large city, as the requirements are far more onerous. Beca's figures appear unreasonably low, and need to be weighted upwards to reflect the considerable lengths of lines to be installed in cities;[157]

421.3 traffic management costs are derived solely from Kapiti and Horowhenua data. Use of Horowhenua and Kapiti figures will misrepresent the complexity of traffic management in cities. In Aurecon's experience, many roads in Auckland have traffic management costs in excess of **[CI:]**, and major arterial routes are even higher. At typical trenching productivity rates, this equates to traffic management costs of **[CI:]** or higher: considerably higher than the $5.26/m nominated by Beca;

421.4 Beca's use of industry standard trenching rates is a good starting point. In Aurecon's experience, however, productivity rates in the field for UFB works are lower than for other trenched services because the underground corridor is typically very congested and downtime is required to resolve service clashes, for example by relocating other utilities. Aurecon reports that, in a large city, a half day of disruption in each working week is not unusual, resulting in productivity loss of about 8% for a team – which should be reflected in Beca's rates estimates;[158]

421.5 reinstatement costs and requirements vary significantly around New Zealand and cannot be assessed by an assumption that reinstatement in asphaltic concrete at standard width. Many local authorities require a full 2.5m of footpath to be reinstated or a full traffic lane to be sealed. We elaborate on these reinstatement requirements below. Given the importance of reinstatement requirements and costs, Aurecon say it is surprising that there is not further reference to them in the Beca report;[159]

421.6 Beca made no allowance for contingencies on the basis that the estimated rates are robust enough to warrant exclusion of contingencies. Aurecon considers that contingencies should be included, to allow for inevitable miscellaneous cost items which may not have been considered by Beca and which are not included in contractors' rates, including:

(a) arborist costs, when working around large and protected trees;

(b) de-watering, which could well be required for work during winter;

(c) service relocations of other utilities in the corridor;

[157] Aurecon "Review of FPP Corridor Cost Analysis" (10 February 2015) at pages 2-3.

[158] Aurecon "Review of FPP Corridor Cost Analysis" (10 February 2015) at page 2.

[159] Aurecon "Review of FPP Corridor Cost Analysis" (10 February 2015) at page 2.

(d) "extra over" reinstatement, for example to repair damage or meet local authority requirements.

Aurecon recommends the use of a 5% contingency figure for regions and 10% for city locations to cover these items;[160]

421.7 Beca rates also appear to have omitted any allowance for preliminary and general (**P&G**) costs.

422 More details on each of these topics is contained in the Aurecon report.

Other Beca methodology concerns

423 Beca's soil and rock classifications were only applied to rural areas. No assessment of soil and rock classifications for city and major suburban rates was undertaken, with Beca instead assuming that all city and major suburban areas are built on medium or hard soil, or on imported or redistributed fill.[161] In our experience, the range of soil and rock types in New Zealand cities varies significantly and is relevant to trenching cost – for example, parts of Auckland are volcanic rock and requires rock saws (at a large cost uplift to trenching).

424 Given these likely deficiencies with the Beca estimated trenching rates, the Commission should adopt Chorus' UFB build costs data included in the Analysys Mason model provided to the Commission as the best available evidence of trenching and reinstatement costs. That data reflects a national network build in current market conditions, and is superior to the indicative all-in cost estimates which Beca obtained from (relatively few) contracting firms.

Underground congestion may require methods other than drilling

425 Where drilling is not possible, for example because of health and safety considerations in areas with underground gas mains, or where underground power lines are present, then Chorus (or the HEO) may need to deploy underground by other methods, including open cut trenching or hydrovac – both of which are more expensive than drilling.

426 The Beca report does not adequately allow for the use of such deployment methods, and instead selects the cheapest method for each job. In our experience, it is not always possible to tell before commencing work whether underground congestion will result in a different deployment method being required. The use of diggers for open-cut trenching and hydrovac also results in higher reinstatement costs, as well as being slower and so resulting in greater traffic management requirements and costs.

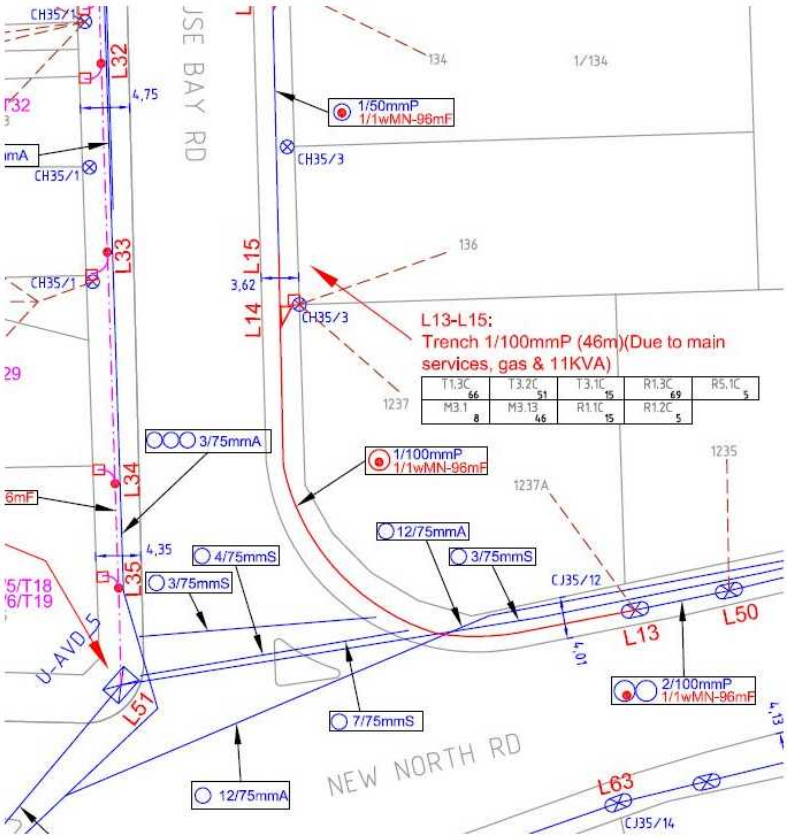
427 In the example shown in Figure C1 below, Chorus was only able to drill **[CI:]** of the planned route because of the presence of gas and 11kv cables. The rest of the area was trenched, causing greater reinstatement cost because the surface was cut often, requiring half footpath replacement. For this area the reinstatement costs were estimated at **[CI:]** per premise passed. In addition, traffic management was estimated at **[CI:]** per premise passed). These costs are far in excess of those included in the indicative

[160] Aurecon "Review of FPP Corridor Cost Analysis" (10 February 2015) at page 3.

[161] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), page 4.

Beca estimates – suggesting their rates do not adequately reflect the likely costs of trenching in New Zealand conditions.

Figure C1: Example route on which deployment methods other than drilling required.



Reinstatement costs

428 The Commission uses Beca's estimates of trenching costs, which include standard width 30mm asphalt reinstatement costs and imported backfill where required in urban areas.[162] The HEO would experience reinstatement obligations which are significantly more onerous and costly than simply re-laying asphalt above a trench.

429 Chorus experiences similar reinstatement obligations in its UFB build, which flow from:

429.1 corridor managers' ability under the Utilities Access Act 2010 and the National Code of Practice for Utility Operators' Access to Transport Corridors (the **Code**) to drive heightened reinstatement requirements. Under the Code, utility operators may determine "reasonable conditions" for reinstatement following access to an underground corridor;[163] and

429.2 in situations outside the Code, insistence of an asset owner (e.g. a local council which owns a footpath) that like-for-like replacement is required, rather than simply laying asphalt over a trench.

430 Chorus' build costs data, provided to the Commission, includes details of reinstatement costs. It is based on real world experience, including the examples described below, and is therefore likely to be far superior to the estimates utilised by Beca.

Footpath composition

431 Beca's cost analysis does not adequately account for the reality that many cities have footpaths consisting of surfaces other than asphalt. The indicative breakdown of footpath composition in six major centres is shown in Figure C2, below. Note that Wellington, for instance, has a very different footpath composition compared to Auckland:

431.1 in Wellington, 31% of footpaths are comprised of concrete and 67% of footpaths are asphalt; whereas

431.2 Auckland has 87% concrete footpaths and only 11% asphalt footpaths.

432 This discrepancy is significant because concrete footpaths are more expensive to reinstate than asphalt footpaths. Accordingly, a city, like Auckland, with a higher proportion of concrete footpaths, is going to have higher reinstatement costs than a city like Wellington. Beca's report wrongly assumes that the costs in each city are broadly the same.

[162] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), Appendix 2.

[163] It is possible to challenge any conditions imposed under the Code (see National Code of Practice for Utility Operators' Access to Transport Corridors 2011, section 7 and Telecommunications Act 2001, s141 and 147). In Chorus' experience, however, such challenges are costly, time-consuming and with uncertain outcomes.

Figure C2: Indicative footpath composition in major centres

City	*Concrete Footpaths*			*Asphalt Footpaths*			*Specialty Footpaths*			*Total***
	Length	*Width**	*%*	*Length*	*Width**	*%*	*Length*	*Width**	*%*	
Auckland	*6057km*	*1.6*	*87%*	*745km*	*1.6m*	*11%*	*97.8km*	*3m*	*1.40%*	*99.40%*
Napier	*332km*	*1.52m*	*77%*	*85km*	*2.4m*	*19%*	*6.2km*	*2.9m*	*1.40%*	*97.40%*
Wellington	*274km*	*1.9m*	*31%*	*585km*	*1.9m*	*67%*	*16.9km*	*3m*	*1.80%*	*99.80%*
Nelson	*109km*	*1.5m*	*26%*	*297km*	*1.9m*	*72%*	*3.9km*	*3.1m*	*1%*	*99.00%*
Timaru	*14.5km*	*1.5m*	*3%*	*388km*	*1.5m*	*84%*	*1.9km*	*1.5m*	*1.50%*	*88.50%*
Invercargill	*178km*	*1.6m*	*36%*	*299km*	*1.9m*	*60%*	*2.6km*	*1.5m*	*0.50%*	*96.50%*

** All widths are average*
*** Unsealed and rural footpaths have been excluded*

Source: Chorus' internal UFB and RBI build information.

433 Footpath composition and corridor manager or asset owner reinstatement conditions are each a significant driver of reinstatement costs. These two features would together increase the trenching rates incurred during the HEO's deployment phase far above Beca's estimates. For example, Chorus has recently experienced the following reinstatement obligations under the Code and/or imposed by asset owners:

433.1 Norfolk Street, Ponsonby, Auckland is paved with concrete slabs which cannot easily be cut with a rock saw. These are depicted in the image below. Instead, the slabs must be broken and removed (or a concrete cutter used), and then replaced with new half width concrete slabs. This resulted in far higher reinstatement costs than would have been incurred in 30 mm asphalt reinstatement. Many Auckland streets are paved in a similar manner. See Figure C3, below;

433.2 Jervois Road is an example of a route on which a trench required fuller reinstatement than simply re-sealing the trench width. Auckland Transport (**AT**) conditions required Chorus to replace from midway to the kerb line. In other words, even though the trench in this photograph was only 300mm wide, Chorus still needed to replace half of the footpath. See Figure C4, below; and

433.3 AT imposed various reinstatement conditions for trenching works in central Auckland in its capacity as corridor manager under the Code, including in many cases full panel reinstatement or like-for-like paving replacement regardless of the range in footpath size. Some of the routes shown below required full panel reinstatement. The conditions are depicted in Figure C5 below. Again, asphalt paving would not have met AT's requirements on these routes. The HEO would encounter similar conditions.

433.4 AT imposed similar reinstatement conditions on the streets surrounding Ponsonby Road. The conditions are depicted in Figure C6 below. Again, in many cases half or panel reinstatement or like-for-like paving replacement was required. In none of these cases would 30 mm asphalt over the trench width alone have been acceptable to AT as asset owner. On Ponsonby Road itself, AT required 1m reinstatement in some parts and half panel reinstatement in others, as well as replacement of brick bands where present.

433.5 *Figure C3: half-width reinstatement may be required.*

4-6 Norfolk Street, Ponsonby

Figure C4: Half-width reinstatement was required.

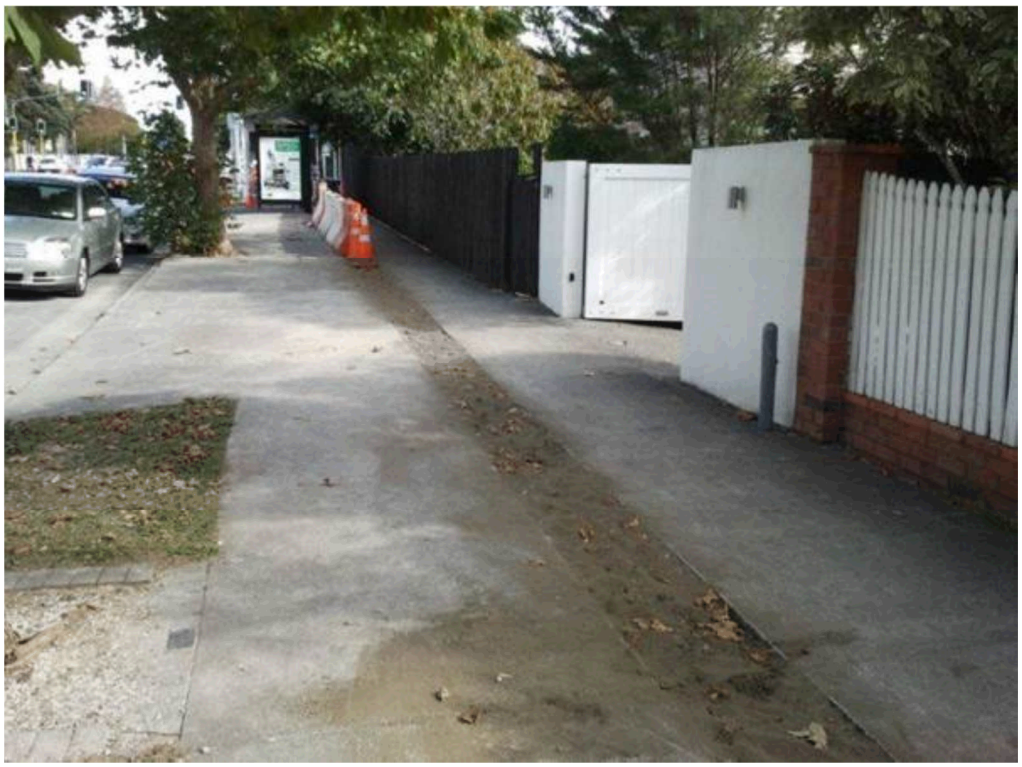


Figure C5: Auckland Transport reinstatement conditions.

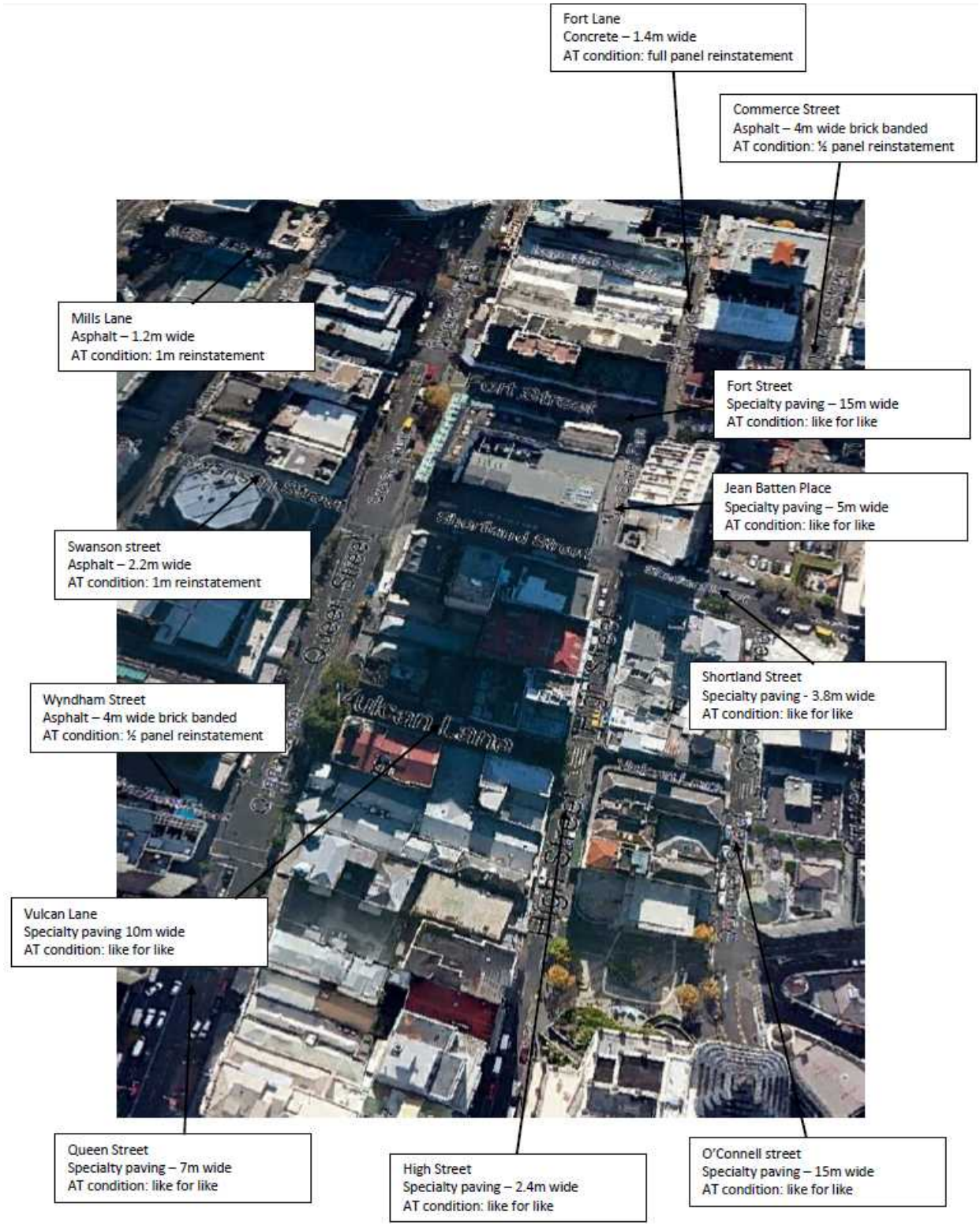
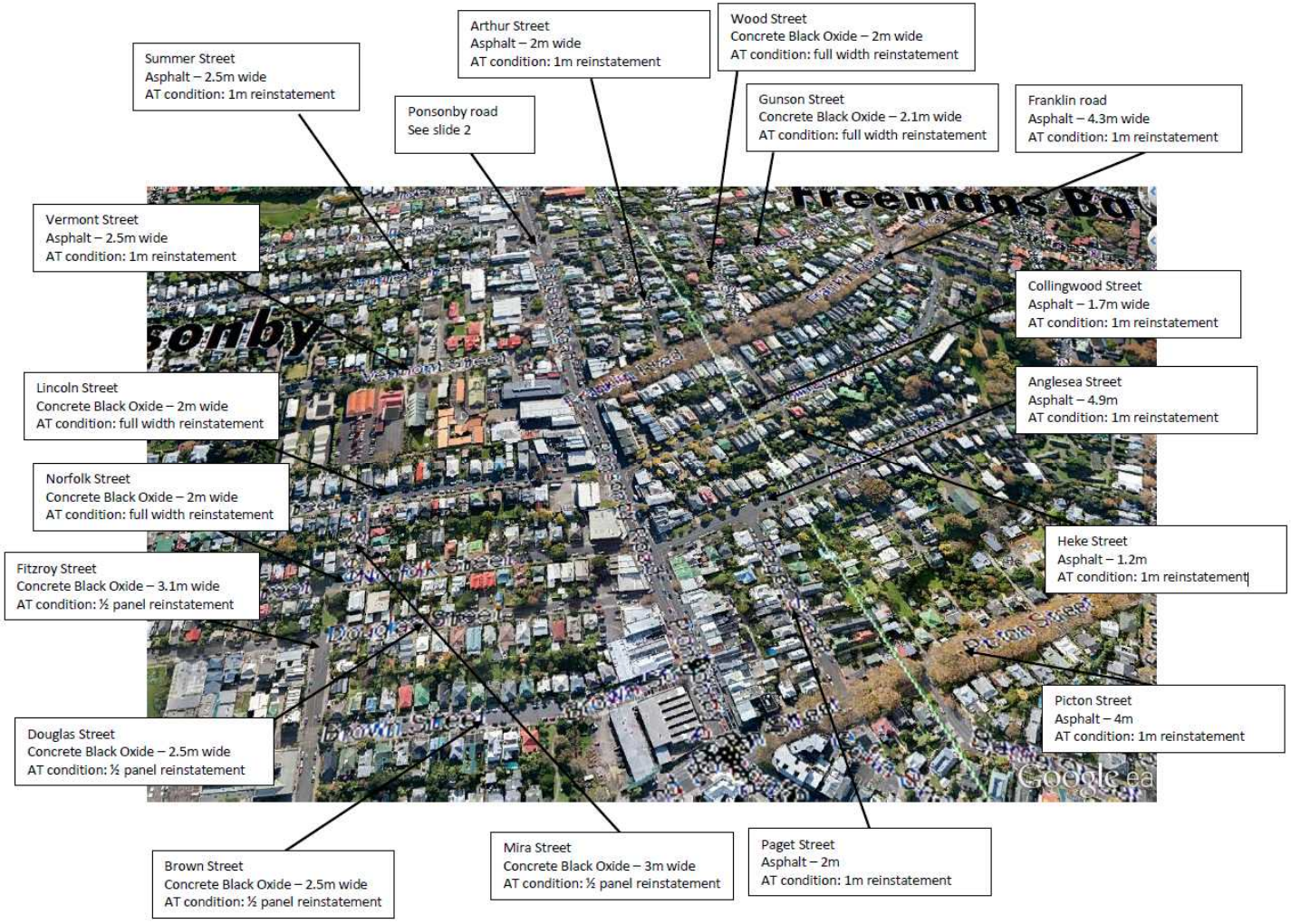


Figure C6: Reinstatement conditions for streets close to Ponsonby Road.



433.6 the central shopping district in Pukekohe is paved with a specialty brick design which is likely to require half width or full width reinstatement. No drilling is possible in this area as a result of the presence of underground services such as water and power. Reinstatement costs were **[CI:]**. Traffic management for this area was **[CI:]** Again, these costs are far beyond those in Beca's estimate; See Figure C7, below;

Figure C7: "like for like" reinstatement of specialty paving.

433.7 like-for-like reinstatement conditions can be onerous and costly if the underlying asset has been finished in a way which is hard to replace. For example:

(a) Chorus' work on Danica Esplanade in Te Atatu (shown in Figure C8 below) resulted in increased reinstatement costs to Chorus;

(b) in AT/FFP169, in which Chorus was required to reinstate bluestone specialty paving, and also replace a 300mm reinforced concrete layer which had to be broken out and then replaced. These works were far more expensive than asphalt – around **[CI:]** and are shown in Figure C9 below.

Figure C8: "like for like" reinstatement of other road surfaces, including plantings and bluestone paving.

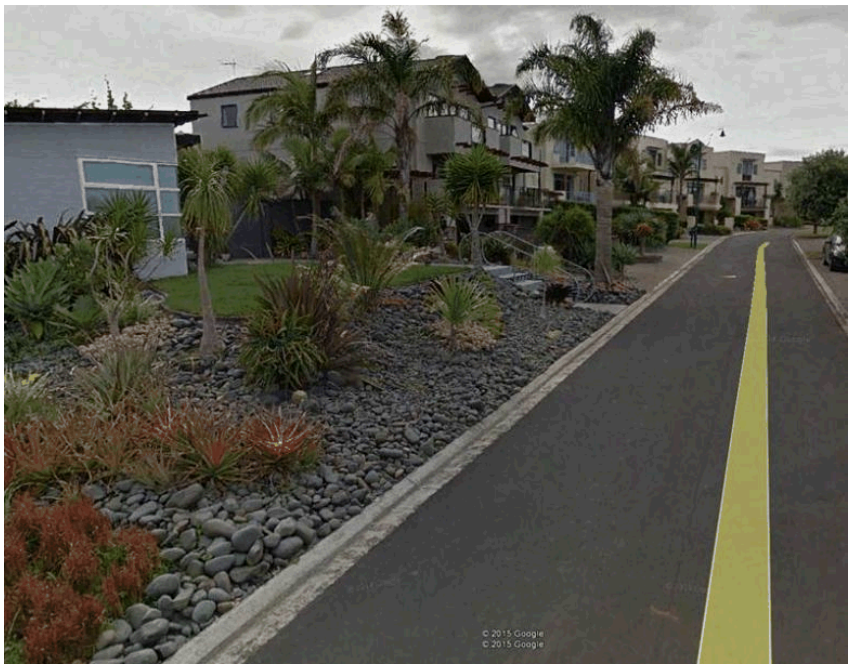


Figure C9: "like for like" reinstatement of other road surfaces, reinforced concrete.

434 The HEO would encounter similar conditions under the Code and asset owner requirements, which in each case will require reinstatement to a standard far beyond 30mm asphalt paving across a trench. The Commission should amend the trenching cost estimates in its draft determination to reflect evidence of actual recent trenching costs, including the reinstatement conditions which would occur in reality.

435 Reinstatement conditions, traffic management and underground congestion also directly inform road crossing costs, which in Chorus' UFB experience can range between **[RI:]** for a small two-lane road to around **[RI: _____]** for a congested four-lane road such as Thorndon Quay in Wellington.

APPENDIX D: OMITTED AND UNDER-ESTIMATED BUILD COSTS

436 In this appendix we describe in more detail the build costs which appear to have been omitted from the Commission's assessment of underground deployment costs. Those costs include:

436.1 service company overheads;

436.2 costs associated with the ETP; and

436.3 build costs associated with traffic management, planning and project management costs, arborists, archaeologists, contaminated sites, and mana whenua liaison.

Service company overheads

437 The Commission has omitted service company overheads from its modelled costs of the HEO's network build. Like Chorus, the HEO would inevitably pay its service company's (or service companies') overheads.

438 In Chorus' experience, it is commercially infeasible to contract directly with civil works firms for each job, given the number of staff and specialist expertise required in a network build. Chorus has retained multiple service providers, including Visionstream and Downer, to undertake civil UFB works on its behalf: those service companies are then responsible for all aspects of build delivery, including engaging and managing all subcontractors on particular jobs.

439 **[CI:**

440

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441 The build costs paid by Chorus to its service companies cannot be considered in isolation from the accompanying overhead charges.

442 As an indicative illustration, for year 3 of UFB build period, Chorus has paid a contract value of **[CI:]** service company overheads. In aggregate these overheads are around **[CI:]** of variable service company costs on UFB and, based on Year 3 numbers, would total approximately **[CI:]** over the 8.5 year build period. Even if its commercial arrangements with service companies were ultimately slightly different from Chorus', the HEO would no doubt incur similar levels of overhead charges.

443 Again, the Commission has omitted these overheads from its modelling of network build costs. We consider this is a material omission and is likely to result in under-recovery.

ETP costs

444 The Commission has omitted the costs related to external termination point (**ETP**).

445 The Commission's draft determination records that "*The ETP is however not part of the access network as its cost is recovered through a different service.*"[164] The Commission is not correct to assume that the ETP costs are recovered as a component of a different service. Chorus is presently obliged to repair or replace faults up to and including the ETP as part of its provision of the UCLL service.

446 In a copper network, the ETP is the point where the public network connects to internal wiring, and the ETP itself forms part of the public network. The ETP is typically located on the outside of a dwelling to reduce operational installation costs. An ETP on a copper network is necessary to enable access to the network at a customer's premises, and forms part of the lead-in to a customer's premises.

447 Where a fibre MEA is adopted, an ETP is also required to enable network access. It is analogous to the copper ETP. Again, the ETP is a component of the public network provided by the network operator and effectively comprises part of the lead-in (as it does, for example, in Chorus' UFB network). The ETP is a necessary part of the network and its costs should be recovered as part of the monthly charge.

448 For some MDUs, wiring to the ETP will include cable to the building distribution frame (where the ETP is at the frame).[165] Such cabling length should be included in the access network build cost.

449 Presumably for analogous reasons, the cost model built by TERA in Denmark in the context of a LRAIC assessment of the copper network included the costs of the Net Termination Point (**NTP**).[166]

450 The Commission's statutory task is to model the end-to-end costs of the service. Defining the service so as to exclude the ETP effectively skews that assessment, because it makes the costs of the FTTH appear lower than they actually are. As Analysys Mason noted in its 6 August 2014 report:[167]

[164] TERA "Model reference paper" (November 2014) at section 2.2.1.

[165] UBA Service Description, cl 3.22; UCLL Service Description, cl 3.1 and cl 2.8: the *External Termination Point* (ETP) definition for the UCLL service is "the external termination point for telecommunications services at an End-user's premises or, where there is no termination point external to the premises, either the first jack on the premises wiring or, **where appropriate, the building distribution frame**" (cl 2.5, footnote).

[166] DBA "Consultation note regarding first draft of the fixed LRAIC mode" (20 March 2014) at page 58; available at https://erhvervsstyrelsen.dk/sites/default/files/media/horingsnotat_0.pdf.

[167] Analysys Mason "Paper on framework and modelling approach" (6 August 2014) at [1.6].

> Redefining the service in such a way as to push the costs onto other parties (such as end-users or the RSPs) does not demonstrate that the revised definition is a more efficient solution (lowest total cost), just that it reduces the costs carried by the modelled operator.

451 The Commission should include the ETP cost in the price for the UCLL service. All wiring before the ETP must also be included.

Traffic management

452 Beca uses a global figure of $5.26/m based on its experience in Horowhenua and Kapiti. As Aurecon (an expert engineering consultancy) has identified, traffic management costs in those regions are likely to be lower than in cities and large cities – see **Appendix C**. Chorus' actual experience across New Zealand shows that average traffic management costs are around **[CI:]** in the UFB areas where we have deployed to date, although the per-route costs vary considerably depending on the type of road and the conditions imposed by the relevant statutory or regulatory authority. Factors which contribute to those variances include:

452.1 labour costs associated with stand-down periods – with Chorus or its service companies generally having to pay contractor crews even during periods when they are not permitted to work;

452.2 costs associated with noise restrictions at night, requiring multiple crews during the day to adequately progress work.

452.3 costs associated with complying with other restrictions imposed in corridor access requests (**CAR**) or work access permits (**WAP**); and

452.4 attenuation/rolling trucks used on motorways.

453 An HEO would experience similar cost variability, which is likely to take its traffic management costs above Beca's estimated $5.26/m rate, particularly in large metropolitan areas such as Auckland and Wellington. For example, the CAR conditions for Chorus' work in Morningside, Auckland, include:

453.1 no work may be undertaken on Level 2, Level 2L and Level 3 roads during peak hours that affect the normal operating conditions of the road. Peak hours are defined as 7:00 – 9:00 am and 4:00 – 6:00 pm (Monday to Friday). Effectively this condition limits the work day to 6 hours, allowing for 30 minutes pack up either side;

453.2 hydrovac work is to be split into sections of no greater than 150m in length. This condition limits the work which can be completed in a day by a hydrovac can be used to trench around 50-60m a day, as sections require backfill and temporary sealing before the work site can be moved forward. It also has traffic management implications, as Chorus requires trucks for backfilling which will causes congestion; and

453.3 work within 200m of a school must be completed between 9:00 am – 3:00pm Mon – Fri. This limits the working timeframe to 5 hours, again allowing for a 30 minute pack up on either side.

454 As part of the CAR for the CBD of Nelson, the sound level of Chorus' works near residential units or short term living accommodation could not exceed 75dB between 10:00 pm and 7:00 am. In addition, Chorus was unable to access the CBD before 6pm as a result of traffic in the area. This considerably shortened the work day, as most work could not be carried out within the 75dB limit. Exceeding the limit might have resulted in operations being shut down. To accommodate with these conditions, Chorus employed additional crews to progress work between 6:00 pm and 10:00 pm. The shortened timeframe also reduced the ratio of time spent building against time spent cleaning up to accommodate traffic and pedestrians the following day.

455 Each of these conditions has significant cost implications which Beca may not have accounted for, or significantly under-estimated, in its trenching rate estimates. In the case of the FFP in which Morningside is located, Chorus incurred total traffic management costs of **[CI:]**, or about **[CI:]** per premise passed. Again, the HEO would encounter similar conditions and costs in some regions of its network deployment.

456 Onerous traffic management conditions are also commonplace under CARs for deployment on motorways. Again, the Beca traffic management rate appears to substantially underestimate these costs.

457 For example, when Chorus undertook activities including drilling ducts under the road, trenching and laying new ducts and installing air blown fibre access terminals along State Highway 16, Kumeu, as part of NZTA conditions (VS36322), we were required to:

457.1 ensure there were sufficient people on site to control the flow of traffic;

457.2 comply with the special access restriction to avoid congestion and minimise safety risks, including restrictions not to undertake deployment from noon on days prior to public holidays or during the Christmas period without express permission; and

457.3 provide an approved Traffic Management Plan, under which temporary traffic management measures would be deployed on one side of the carriageway to minimise bottle necking and minimum land size and speed restrictions were imposed.

458 CARs for work on or alongside motorways also typically require the presence of up to four truck mounted attenuators and rolling signals at a typical set up cost of **[CI:]** per truck per day. Again, Beca has not accounted for these costs in its assessment of corridor costs.

Planning and project management costs

459 The Beca report makes some allowance for consenting costs, but excludes planning and project management costs. Again, the HEO would inevitably incur such costs. Chorus has provided data to the Commission on the levels of those

costs which we have incurred in our UFB build. The model should include allowances for such costs – further detail is in the Analysys Mason report.[168]

Mana whenua consultation and liaison

460 The Proposed Auckland Unitary Plan (**PAUP**) includes 61 sites and places of significance to mana whenua (**SSMW**), and 3600 sites and places of value to mana whenua (**SVMW**). We understand many iwi are seeking to add substantially more Sites and Places of Significance and Value to the PAUP.

461 Chorus' resource consents for Auckland include a 'Framework Process' for working with mana whenua throughout the deployment and installation of UFB (and maintenance and upgrading of the copper network in the same areas). The framework process includes the development of a 'traffic light' system set up to identify and record in a GIS database all known areas of interest/significance to mana whenua recorded on recognised publicly accessible databases. Further details of the process are in the Incite report at pages 11-12.

462 The framework process development and implementation has resulted in Chorus incurring significant costs. By way of illustration, in Year 4 of the UFB rollout, 38 FFPs (out of 380 FFPs) had mana whenua issues (and a further 82 with heritage issues). We anticipate around 40 FPPs (out of 388 FFPs) with implications for mana whenua in year 5.

463 The HEO would incur similar expenses in deploying in Auckland, which, again, are omitted from the Beca report. Chorus expects that similar mana whenua liaison obligations are likely to soon come into effect in the Wellington district plan**.**

Arborists

464 Arborist involvement in aerial deployment is generally required under RMA consent conditions. Arborists may also be needed when trenching around large or protected trees to ensure that underground works do not disturb the root ball of a tree. Activities typically undertaken by arborists include inspecting the plans and preparing a site-specific management plan, doing walkovers and stand overs.

465 Chorus pays around **[RI:]** on arborist activities. These costs appear to have been omitted from the Commission's build costs model and Beca has not allowed for contingencies associated with arborist work in its trenching cost estimates.

466 Arborists' reports, if required, are typically submitted to Auckland City Council as part of the approval process. Site meetings and monitoring are often required under the terms of any consents. In areas where trees are prevalent, such as in Titirangi, the costs associated with arborists reporting and monitoring exercises amount to a considerable cost for Chorus. For example, the costs associated with the arborist reports and consultation as part of VSL UFB AERIAL TGN01-FFP07 Titirangi Exchange amounted to **[CI:]** per premises passed for this cabinet area.

467 The HEO would inevitably encounter similar arborist costs, whether it was utilising Chorus' existing consents or obtained new resource consents.

[168] Analysis Mason, "UCLL and UBA FPP Draft Determination Submission" (20 February 2015) at [3.3].

Archaeologist costs

468 In areas of known or suspected pre-1900 activity (Maori or European), Chorus is required to obtain an archaeological authority under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site. In our experience, areas with high known risk of archaeological discoveries require obtaining a global archaeological authority from Heritage NZ. Arborist involvement, site meetings and monitoring/reporting may be required.

469 Again, HEO would be subject to the same obligations and these should be reflected in the Commission's model and in a contingency allowance.

Potentially contaminated sites

470 RMA consent conditions for work on or adjacent to potentially contaminated sites may require testing and/or special removal processes of excavated material. For example, Nelson City Council has imposed conditions requiring that Chorus undertake testing of excavated material. Contaminated soil must be removed and transported by appropriately licensed and approved transport operators (typically at an additional per-tonne cost).

471 Again, the HEO would be subject to similar obligations, and these costs should be accounted for in the Commission's model and an allowance made for stoppages while contamination issues are addressed.

Other omitted costs

472 The Commission/TERA approach also omits several costs which the HEO would incur in deploying a new network. These costs are identified in section 3.4 of the Analysys Mason report.

APPENDIX E: AERIAL NETWORK DEPLOYMENT

Overview

473 Modern planning regulations and limitations on access to the electricity lines companies' aerial distribution networks mean there is significant difficulty in achieving aerial deployment of new telecommunications lines.

The Commission's model requires amendment

474 The Commission appears to have assumed away much of this complexity and cost by adopting a simple "joint build" hypothetical scenario in which a new pole network is constructed and the costs of aerial deployment are shared equally between the HEO and electricity lines companies, with each taking the benefit of Chorus' existing resource consents.

475 Even if the joint build approach is adopted, amendments to the Commission's model are required to account for commercial and legal realities which cannot be "assumed away" and which will result in the HEO incurring additional costs. In particular:

475.1 the Commission has based its unit cost for distribution poles on the lead-in poles currently deployed by Chorus in its network. But these poles are not structurally capable of carrying both electricity and telecommunications, which is what the Commission has assumed in order to justify the 50% reduction of aerial deployment costs;

475.2 various RMA and planning issues, including:

(a) the reality that Chorus' existing pole network is not specifically consented (rather, it is protected by existing use rights), and so, even with the benefit of Chorus' UFB consents, the HEO would be unlikely to obtain consent to erect a new pole network given visual pollution concerns; and

(b) the difficulties with obtaining consent for the erection of new poles and additional aerial crossings, each of which is generally prohibited under Chorus' existing UFB aerial deployment consents (which are typically worded so as to permit the addition of one fibre strand alongside existing copper lines); and

475.3 the need to account for pole inspection and other variable costs associated with operating an aerial network once the "joint build" is complete.

476 We describe these real-world limitations on aerial deployment further, below.

Shared deployment is unrealistic

477 In the real world, the HEO would face, as Chorus faces in relation to UFB deployment, a pre-existing aerial access network owned by electricity lines companies. The Commission's joint build assumption therefore has no resemblance to the actual commercial negotiations that would be required between the HEO and electricity lines companies for access to the lines companies' infrastructure. Our experience with infrastructure pole sharing in the

New Zealand context demonstrates that lines companies and Chorus have very different pole access needs, with Chorus requiring access to lines companies' poles far more often than lines companies use Chorus' poles.

478 The Commission's approach therefore risks overstating the feasibility of aerial deployment (as we believe its model has done) and excluding costs that the HEO would face from the Commission's model.

479 In our view, the HEO would inevitably end up sharing poles with electricity lines companies rather than undertaking a new joint build. In our view, modelling this "shared" scenario is more realistic than the Commission's joint build approach.

480 We elaborate on the feasibility of aerial deployment under the shared approach. We also describe and give examples of the costs which an HEO would face in a shared aerial deployment scenario.

Amendments to Commission model

Higher pole specification required

481 If the Commission's joint build approach is adopted, the Commission must model a distribution network that is capable of complying with its assumption of an access network that serves both telecommunications and electricity services.

482 TERA's model specification assumes a 4.5m pole height. The Commission should amend this parameter to reflect the reality that the HEO will require poles which are sufficiently tall and strong to:[169]

482.1 **meet minimum road crossing height requirements** as follows:

(a) the Act, which requires that wires must not be placed so as to interfere with road traffic, and deems that no interference with lawful traffic occurs if wires are placed 5.5m or more above the surface of a public road, where the wires cross a public road;[170] and

(b) the New Zealand *Electrical Code of Practice for Electrical Safe Distance* (NZECP 34:2001), which requires a minimum safe distance of conductors from the ground of 5.5m across or along roads or driveways for circuits not exceeding 1 kV, and 6.5m for circuits between 1kV and 33kV. Some circuits between 11kv and 33kv may require 7m clearance;

482.2 **carry electricity distribution lines**. TERA's assumption that all HEO poles will be available for sharing with electricity lines companies mean that taller and stronger poles should be costed in the Commission model.[171] The HEO's poles will be of limited attractiveness to electricity

[169] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.8], [3.2].

[170] Telecommunications Act 2001, s149. Some council codes of practice permit poles at a lower height over footpaths (i.e. where no road crossing occurs). See, e.g., *WCC Code of Practice for working on the Road* (August 2006) at [7.4.6], which specifies a 5.5m or 6m minimum height over the carriageway and a 4.25m minimum height above all other areas of a road.

[171] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.8], [3.2].

lines companies if they are insufficiently high and strong for distribution use.

483 The Commission should therefore amend its assumptions about pole size and height in the Commission model to reflect lines companies' technical requirements for electricity poles.

Resource consent constraints

484 As Chorus has previously submitted, "*what is preventing us from achieving a higher percentage [of aerial deployment] is a combination of legal constraints, an inability to secure access to the poles of third parties, and the cost of securing access*".[172] These constraints would equally apply to the HEO's aerial deployment and include RMA requirements to obtain consent for aerial deployment. Consenting issues cannot be assumed away by positing a scenario where the HEO and electricity lines companies somehow "step into" Chorus' consents.

485 The Commission reasons that, because:

485.1 the HEO would replace Chorus' aerial infrastructure with its own; and

485.2 the HEO would obtain the benefit of Chorus' existing resource consents, some of which permit aerial deployment,[173]

there is no need to consider resource consent issues associated with deploying new aerial infrastructure.

486 We commissioned planning experts, Incite (Auckland) Ltd, to:

486.1 give an overview of the constraints on Chorus' existing suite of aerial deployment consents

486.2 comment in light of those restrictions whether the HEO would be able to:

(a) obtain the benefit of Chorus' existing suite of consents through normal legal means; and

(b) be able to use Chorus' existing suite of consents to achieve the deployment strategy in line with the build assumptions modelled by TERA; and

486.3 comment on the ability of the HEO to deploy a new pole network to replicate Chorus's service pole network.

487 Incite's report is provided with this submission.[174] Incite's key findings are:

[172] Chorus "Submission on Commission's framework and modelling approach" (6 August 2014) at [62].

[173] Commerce Commission "Draft determination for UCLL" (2 December 2014)at [613].

[174] Incite "FPP RMA Report" (10 February 2015).

487.1 Chorus' existing consents for aerial deployment do not cover all areas. So the HEO would need to apply for consents in at least some towns and regions.

487.2 in the areas for which Chorus does have consent, it was necessary for Chorus to develop an aerial deployment methodology that minimised visual effects to the position where councils were comfortable to grant resource consents on a non-notified basis. This requires a Council to conclude that any visual effects are "less than minor". Under that standard methodology (which forms the primary basis for Chorus' existing consents) there are key deployment rules which Chorus must follow. These relevantly include:

(a) no new road crossings can be created – road crossings must follow existing electricity or telecommunications lines across the road;

(b) existing Chorus service poles may be replaced with a new pole within 2 m and up to 1 m higher, but no new poles may be installed;

(c) customer lead-in lines up a right-of-way or linking between poles in the road reserve are to follow the existing copper network in the same envelope (no link up of new spans where there is not copper is allowed);

(d) the final customer connection span from the last pole to the premises must either replace an existing copper line with a new hybrid copper/fibre line, or if no copper then follow an existing electricity connection, but not create a completely new overhead connection where one doesn't exist. If there is existing Chorus underground duct space available this must always be used in the first instance.

Where the above requirements cannot be met, the line must be placed underground or a specific resource consent sought; and

487.3 the HEO, even if it somehow obtained the benefit for Chorus' existing consents, would continue to be subject to these key deployment rules. The Commission's aerial deployment parameters should be amended to ensure that the HEO's aerial build is compliant with such rules.

488 Incite also advised that, in its expert opinion:

488.1 there are likely to be consenting difficulties in deploying a new overhead pole network in an urban environment. Chorus did not obtain fresh consents during the UFB process for its service pole network, rather, its consents merely allow Chorus to attach fibre lines to its existing service poles. Chorus' poles are part of a legacy network which, to the best of Incite's knowledge, has no existing consents given it would have been deployed before such restrictions were in place, and thus would be operating under existing use rights under the RMA. Because Chorus' existing pole network will not be available to the HEO (because the HEO

displaces Chorus), the HEO would need to gain resource consents for a completely new service pole network – which is likely to be extremely difficult, for the reasons in Incite's first report;[175]

488.2 significant portions of Auckland are of importance to mana whenua, including 61 sites of significance and 3600 sites and places of value. Chorus has developed an elaborate framework process to develop relationships with, and liaise with, iwi groups in relation to these sites; and

488.3 although from a strict legal perspective the HEO could obtain a legal transfer of Chorus' existing consents, those consents were granted to Chorus as a trusted network utility operator on the basis of there being particular processes in place (e.g. training of contractors, GIS tools, relationships with iwi etc.), and a HEO would have to meet all of the same requirements to be able to undertake work under the Chorus suite of consents, as well as obtain any other required approvals from the road controlling authority for corridor access.

489 To the extent that the Commission has relied on assumptions about what Chorus' resource consents would permit in reaching its conclusions as to the proportion of aerial deployment able to be achieved, it should revisit this to reflect the restrictive nature of Chorus' existing suite of consents. The Commission should also ensure that its modelling assumptions for pole location and lead-in assumptions accurately reflect RMA constraints on those types of aerial work.

Pole inspection charges and other variable costs

490 The Commission's approach to modelling the costs of aerial deployment is, as noted above, far removed from the real-world scenario faced by Chorus in relation to its UFB deployment and which would be faced by an HEO.

491 However, even allowing that the Commission's model is an appropriate means of considering an efficient contribution to the direct costs of aerial deployment by an HEO, an allowance should be made for the real-world costs that an HEO would incur relating to administration of pole sharing arrangements that do not recover the direct costs of asset deployment. These include the costs of pole inspections, and an allowance for application fees charged by electricity lines companies for handling requests for access.

492 In the real-world, Chorus pays, and an HEO would pay, pole access charges, set by the lines companies at a commercial rate, together with supplementary charges relating to the sharing of infrastructure. Supplementary charges include the following:

492.1 **[CI:**

]; and

492.2 **[CI:**

[175] Incite "RMA Analysis Report: Fibre to the home (FTTH) aerial network for a hypothetical new entrant" (31 July 2014).

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493 The Commission should adjust the cost reduction for shared aerial network to less than 100% to account for costs associated with network sharing, including pole inspection fees, which are not directly related to the cost of deployment and which would be charged to an HEO.

Other corrections for aerial deployment

494 Our investigations have identified other adjustments or corrections are needed for the Commission's model to reflect the need for spare copper and fibre cables, and in relation to the types of fibre cables which may be aerially deployed. These points are more fully described in the Analysys Mason report.[176]

Shared deployment scenario is more realistic

Feasibility of aerial deployment

495 If the Commission adopted a more realistic scenario of aerial deployment – one in which the HEO must obtain access to a pre-existing electricity lines company distribution network, there would be practical constraints on aerial deployment which Chorus has experienced in its UFB rollout, and to which the HEO would also be subject, that the Commission would have to take into account. Those include:

495.1 whether a suitable pole is present and/or can be erected;

495.2 whether the HEO has an arrangement with the pole owner permitting it to access the pole;

495.3 pole congestion; and

495.4 costs of aerial deployment relative to underground.

496 We set out our views below on the significance of each of these constraints.

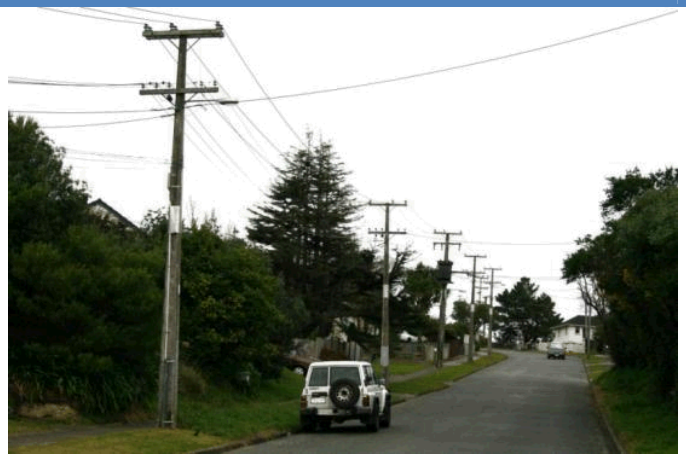
Real-world constraints on aerial deployment

497 Chorus, like any efficient network operator, is seeking to minimise its costs by achieving the highest possible aerial deployment rate. Chorus' existing pole network largely consists of lead-in and service poles, and it therefore relies on seeking pole access and sharing arrangements with electricity lines companies in order to achieve aerial deployment.

498 In practice, Chorus finds that its ability to utilise existing electricity lines company and utility poles (or erect a new pole) is constrained for a variety of practical reasons, as depicted in the matrix in Figure E1.

[176] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [2.9], [3].

Figure E1: Matrix of practical constraints to aerial deployment

#	*Issue*	Relevant constraint	Example	Chorus remarks
1.	*Is there an existing pole at the location where Chorus requires one? If not, can new poles be erected?*	It is not possible to move the location of electricity lines company poles, electricity lines company poles simply "are where they are". The HEO's poles will not necessarily correspond with existing electricity lines company assets. If a suitable pole is not present then a new pole will be needed. Beca estimates the cost of building a new pole suitable for lines company use at $5,000.[177] This figure is consistent with Chorus' experience, although in some cases the costs of a suitable pole may be much higher. The HEO may well conclude that undergrounding is cheaper than installing a new pole.		In this example of a typical urban street, the lines company poles are spaced at around 40m and are not matched by Chorus poles on the other side of the road.

[177] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), Appendix 2.

		Additional difficulties with pole placement may arise as a result of trees. Negotiating aerial lines around trees can be costly and require extensive arborist work.		In this example, aerial deployment would be possible but not straight forward. Negotiating the trees will add to cost (and here, the tree interference is in the cable span and not around the pole heads). An HEO may well find it is cheaper to deploy underground, assuming that can be achieved under RMA consent conditions and without damaging tree roots.
2.	*Given RMA constraints and local council requirements, is it possible to erect a new pole or establish a new aerial crossing?*	RMA issues often mean no new pole can be erected and/or no new aerial road crossings are permitted, even if there are existing poles in the area. For example, *Chorus Overhead UFB Architecture Consenting Rule Book* for Auckland provides that, while existing Chorus poles may be replaced by slightly higher poles, no new network poles are permitted: instead, the lines must be undergrounded or a specific resource consent obtained for the new pole.[178]		In this photograph, Chorus has undergrounded its cable network on the other side, so there are no aerial road crossings. The HEO would be unlikely to obtain consent to establish new aerial road crossings (and Chorus' existing suite of consents generally prohibit the establishment of new crossings).

[178] Chorus Overhead UFB Architecture Consenting Rule Book, sheet 4.

Many councils are also engaged in progressive undergrounding works, and may have scheduled pole removal or otherwise be unwilling to allow aerial deployment in areas scheduled for undergrounding. For example, Vector has committed to spend $13.2 million in 2015 on undergrounding overhead power lines in urban parts of the former Auckland, Manukau and Papakura areas.[179]

3. *If a new pole is permitted, what are costs relative to undergrounding?*

In many areas, it will be cheaper to underground (e.g. mole plough) than to erect a new pole.

This example shows a rural (RBI area) road where Chorus laid fibre for Edendale School (Southland). Although poles were available alongside the road, the actual cost to underground using moleplough was around **[CI:]** per metre across the whole job (about 35km). This rate was cheaper than aerial using existing poles. Hence, in this case, Chorus elected to underground despite the presence of existing poles. The HEO would make similar evaluations for each route on which it deployed.

[179] Vector "Undergrounding" (Webpage, undated) accessible at http://vector.co.nz/undergrounding.

		The decision to underground is also informed by the number and cost of lines company poles which must be replaced prior to aerial deployment. The aerial deployment decision will turn in part on the concentrations of poles to be replaced: if they are clustered in particular streets then the HEO might seek to avoid deploying aerial in those streets. If the poles to be replaced are scattered then undergrounding in some small areas may enable the cost benefits of aerial deployment to be achieved.	**[RI:** **]**	This example table shows Chorus' indicative measures for use in its UFB deployment to identify routes on which underground deployment is likely to be cheaper once pole replacement costs are taken into account.
4.	*If an existing pole is available, does Chorus (or the HEO, as applicable) have a pole access agreement with its owner.*	A pole access arrangement is needed before an electricity lines company pole may be used.	Chorus' practical experience is that: • many pole access agreements require a substantial degree of negotiation with lines companies, often lasting for months or years before an agreement is concluded • informal pole access agreements are no longer permitted, because lines companies do not accept that fibre lines are "existing works" for the purposes of Telecommunications Act 2001 provisions dealing with pole sharing, and also because of HSE requirements.	

5.	*Is the pole suitable for sharing with Chorus assets?*	**[CI:**		In this photograph, the poles on the right hand side are Chorus-owned. They would require strengthening or replacement to carry electricity lines (other than lead-ins). As such, Chorus could not offer to share them with a lines company. An HEO would encounter the same issue, unless it installed stronger poles (at a correspondingly higher cost).
		]		

In this photograph, the pole was assessed as requiring replacement because it was not sufficiently robust to support additional aerial fibre lines.

6.	*Is there space on the pole for Chorus assets?*	Many electricity lines company poles are highly congested, which means there is limited or no space available for Chorus (or the HEO's) assets. Congestion results from: • Poles in use by other telcos (e.g. Vodafone coax lines on WEL poles) • limited space between electricity corridor and minimum height clearance requirements • the presence of a FAT or transformer on pole can significantly reduce space for telco assets • street lamps • Scada equipment		This example photograph shows a very congested pole. The lines company required the street lamp to be relocated, at Chorus' cost, before the pole could be used for aerial fibre deployment.

Chorus' pole sharing arrangements generally provide that Chorus must not place any assets on lines company poles in such a way that those assets interfere with the safe and efficient operation of the lines company's network. In practice, this means that:

- some poles are too congested to use, and the fibre network must be undergrounded despite the presence of electricity lines company poles on a route
- in some other areas, Chorus must install its fibre within or above the electricity envelope, incurring higher qualified technician labour rates.

The HEO would experience both of these constraints.

This example photograph shows multiple voltage lines and the placement of a transformer and a street lamp on a pole. Deployment on this pole would involve significant rearrangement, possible strengthening, and onerous HSE requirements given the electricity lines all around the pole. Such severe congestion means that Chorus (or the HEO, as applicable) is unlikely to be able to use this pole for aerial fibre deployment.

This example photograph shows a pole holding a Yagi antenna. The electricity lines company did not permit Chorus to utilise the pole, meaning the area needed to be undergrounded.

7.	*Pole work costs*	Even if all of the above steps are navigated, placing assets on a pole can involve significant expense: • If work is conducted in the electricity corridor (where there may be more space if there is congestion at lower levels), specially qualified personnel are needed at significant additional cost. Beca estimate the costs of electrically certified staff at $150/h, double the rate of	

non-certified telco technicians.[180] This cost uplift should be reflected in the Commission's modelling;

- Installation of fibre lines in the electricity corridor requires ongoing maintenance using electrically certified staff, typically under a fixed term arrangement with a lines company; and

- Some poles (e.g. certain types of concrete pole) cannot be accessed with ladders, and a platform must be used to respond to HSE concerns, with corresponding cost implications. Access requirements are dynamic and are imposed by pole owners.

[180] Beca "FPP Corridor Cost Analysis of Trenching and Ducting Rates in New Zealand" (25 November 2014), Appendix 2.

APPENDIX F: FIXED WIRELESS NETWORK DEPLOYMENT

Overview

499 If, contrary to our primary position, the Commission adopts in part a FWA MEA, then the Commission's FWA model must take into account the functionality of the service that is to be provided over the network, and real-world considerations and their associated costs.

500 The model currently used by the Commission does not demonstrate that it can provide the UCLL service to end-users, and the model does not take into account the costs of serving all end-users to a high degree of confidence.

501 The Commission has utilised the Vodafone RBI network as a proxy for the network that would be deployed by an HEO. However, this proxy has limitations and the Commission must ensure:

501.1 realistic levels of capacity to support end-users within the period considered (taking into account that UCLL is an unconstrained input into the UBA);

501.2 realistic coverage assumptions; and

501.3 realistic costings for all components of the network.

502 Once these matters are properly accounted for, it is unlikely that FWA deployment will be more efficient than FTTH.

Vodafone's RBI network is not an efficient proxy for the HEO's FWA network

503 The Commission's FWA model has utilised the Vodafone RBI network as a proxy for the network that would be deployed by an HEO. However, that RBI service is a specific service built to achieve particular parameters that are different from the UCLL and UBA services provided by Chorus.

504 The result is that that Commission has not modelled a FWA network that can demonstrate that it can provide the UCLL service to end-users.

505 Specifically, Vodafone's RBI network is not an example of an efficient footprint that the HEO would necessarily adopt to deliver the UCLL and UBA services. Vodafone's RBI network is a government subsidised project with the primary aim of delivering better broadband access to rural areas where the costs associated with geography, line distance and low population densities would otherwise make the delivery of network infrastructure cost prohibitive.

506 Vodafone's RBI service target is to provide 5 Mbps peak to 80% of end-user household within zone 4. In comparison to UCLL, which is an *unconstrained* input into UBA that is available to *all users* within the service area, the RBI service will be cheaper to build and is therefore not a realistic reflection of the costs associated with a UCLL MEA.

Capacity

507 If FWA is to be considered as a valid MEA for UCLL, the HEO's FWA capacity needs to be able to support an unconstrained service for end-users during the regulatory period.

508 End-user bandwidth requirements are steadily increasing. Our current forecasts, based on historical growth, suggest that by 2020 the average bandwidth requirements for an end-user in peak hour may be in the order of **[RI:]** by 2020.

509 The Commission model only allows for a constant bandwidth requirement of 250 kbps per end-user. This is lower than the bandwidth expected to be delivered by Chorus at the commencement of the regulatory period and assumes, contrary to real-world projections and experience, that bandwidth will not experience any growth during the regulatory period.

510 In order to ensure that the Commission model takes into account the costs of the HEO providing sufficient capacity / bandwidth to cater for end-users' needs for the whole of the regulatory period the Commission model should be dimensioned so that it has sufficient capacity to deliver anticipated growth in demand throughout the regulatory period.

511 This can be potentially achieved via:

511.1 the deployment of more equipment at the site;

511.2 using additional spectrum;

511.3 deploying more sites; and/or

511.4 serving fewer end-users (i.e. less than 67 users per site).

512 Costs for additional spectrum (more than just the current 700MHz band allocations), equipment, sites and their associated installation and maintenance should therefore be included in the Commission model.

Coverage and Availability:

513 The assumption that the 67 most expensive customers in a service area can be served by FWA is overly optimistic, and cannot be relied on without factoring in an allowance for FWA propagation failure rates, and costs for fixing these issues. The Commission model should either:

513.1 reduce the amount of saving achievable by assigning end-users to FWA – to reflect the probability of failed install; and/or

513.2 increase installation costs to cover for specialised installation.

514 Section 3.9.1 of the TERA model documentation states that "*identification of the customers that will be served by a FWA connection … is carried out by identifying the sections located in the coverage areas provided by Vodafone*". TERA note capacity constraints, but not coverage constraints, and there are no fall back options costed in the event of propagation related failure.

515 The Commission assumes in the draft determination that the most expensive 67 premises can be served by the FWA infrastructure with the remaining premises connected by point-to-point fibre to the nearest exchange. This assumes that all the "most expensive premises" can receive adequate signals from the hypothetical tower.

516 This assumption cannot be reconciled with the nature of radio propagation[181], given the Commission model does not appear to take account of high failure rates that can arise as a result of obstructions in the propagation environment. We are not aware of any mobile operator that guarantees coverage in the way that the Commission's model effectively does in respect of the 67 most expensive premises. For example, Vodafone in its terms and conditions for wireless broadband relating to its RBI network, expressly states that: [182]

> Vodafone does not guarantee that the [wireless broadband] can be supplied. As part of the installation the installer will perform an additional check to ensure there is sufficient coverage for the service to work. In case there is insufficient coverage the customer will not incur any cost for a failed install in this case.

517 We do not have access to information about Vodafone's failed installation rates in the RBI network, however, we are aware, from other sources, that the practical experience of FWA deployment is that material failure rates do occur.

518 In the 2000s, Telecom undertook the BCL Extend Project to extend its services to rural customers. The number of "failed installs", even within a notionally served area, was quite significant. **[RI:]**[183]

519 Telecom had to develop various solutions to enhance the systems performance. One example of a solution was called "long IF" where an antenna was mounted on a new pole outside a shelter belt, fed with a long piece of coax cable from the indoor unit. This involves the use of additional trench and new pole which can amount to over **[RI:]**[184]

520 The real-world experience of the NBNCo roll out in Australia is that failure rates of around 7% have been experienced, even where a house is within an FWA cell site's notional coverage area. [185] This is because in practice, FWA suffers from radio propagation limitations due to shelter belts, local clutter and terrain. Models of propagation used to generate the notional coverage areas only incorporate some of these effects and then using statistical methods.

521 The Commission model should therefore allow for an appropriate percentage of failed connections or an adjustment to fixed costs to allow for additional unforeseen costs to address failed connection rates.

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[181] Radio propagation is the behaviour of radio waves when they are transmitted, or propagated from one point on the Earth to another, or into various parts of the atmosphere.

[182] Vodafone "Wireless broadband: Terms and Conditions", available at http://www.vodafone.co.nz/legal/terms-conditions/wireless-broadband/ at [8].

[183] Bruce Whitside and Bruce Cochrane "Aggressive Install Options Paper" (July 2004) at page 10.

[184] Bruce Whitside and Bruce Cochrane "Aggressive Install Options Paper" (July 2004) at page 10.

[185] NBNCo "Fixed Wireless and Satellite Review" (May 2014) at 85.

Spectrum costs

522 TERA has not used the final price paid in the spectrum auction. The Commission should increase the assumed spectrum cost to the price paid on the final outcome of the 700 MHz auction.[186]

Additional network costs

523 TERA has modelled a very limited subset of the costs which would be incurred by an HEO wishing to use FWA to provide even the "core functionality" the Commission considers sufficient for an MEA.

524 Even with the Commission's limited definition of the "core functionality" of the UCLL service, in order for an RSP to use a UCLL service provided over FWA to provide voice and broadband services to end-users, the FWA must be deployed to be capable of:

524.1 providing connectivity to the end-user;

524.2 simultaneous use by multiple RSPs.

525 Providing a radio transmitter and limited backhaul is insufficient to permit use by multiple RSPs to provide voice and broadband services to end-users. This implies direct connectivity from multiple RSPs directly to NodeB equipment at each cell site. This would be a highly unorthodox engineering approach and raise a number of complex technical issues regarding traffic management, dimensioning of the network and sharing of resources.

526 In practice it would be necessary for the HEO to deploy some core network functions which enable access to the network by multiple RSPs. The core network (EPC – Evolved Packet Core) is responsible for authentication, signalling, traffic routing/ management, and connectivity to external world.

Customer Premises Equipment

527 The Commission and TERA have excluded the costs of customer premises equipment (**CPE**) for FWA. In the context of a wireless service, the CPE is equivalent to the metallic termination at the end-user's premises (i.e., the External Termination Point or ETP).

528 The installation cost for CPE should therefore be taken into consideration. Unlike a DSL modem that the user can install themselves, most FWA CPE installation involves the setup of an external antenna (to obtain better radio signal – Vodafone NZ's default solution has a yagi antenna). In some circumstance, skilled technicians will be required to install the CPE.

529 It is impossible to make any meaningful claims regarding the capacity, coverage and capability of an FWA network without including the CPE, comprising antenna and wireless network terminal, as part of the access service, and consequently including the costs of those elements. A HEO would be unwilling and unable to offer a service with any meaningful service levels without being able to guarantee the CPE used was capable of delivering the service. This is evidenced by operators which include CPE in their service.

[186] Analysys Mason, "UCLL and UBA FPP draft determination submission" (20 February 2015) at [6.4].

APPENDIX G: THROUGHPUT ASSUMPTIONS FOR THE UBA SERVICE

530 This Appendix explains why some of TERA's assumptions and modelling approach will not adequately compensate for the costs of accommodating expected UBA demand by the end of the regulatory period, and particularly if demand exceeds that predicted by historic growth trends. In particular, TERA's assumptions concerning:

530.1 backhaul links between the DSLAM (ISAM or DSL access node) and the Aggregation Switch (i.e., FDS); and

530.2 the interlinking dimensioning between multiple physical switches in a nominal FDS site.

531 This Appendix also discusses current and historical traffic trends as drivers of the dimensioning of the feeder and core network, and identifies the services which are the contemporary drivers of peak traffic.

Backhaul links

532 The Commission has modelled the dimensioning of the DSLAM to FDS backhaul at a single 1 GigE link per subrack. We agree that it is likely that an HEO today would deploy a single 1 GigE link per subrack. However, by year 5, a 1 Gbps backhaul will be saturated for many DLSAMs and the HEO would be required to add a second 1 GigE link per subrack.

533 Chorus' current bandwidth growth forecast model shows Chorus providing throughput of approximately **[RI:]** per end-user at the beginning of the regulatory period in 2015. Our present forecasts are that throughput will rise to around **[RI:]** per end-user by the end of 2020, as shown in Figure G1, below. **[RI:**

]

534 This forecast assumes underlying growth per annum of 50%, based on historical trends and external forecasts. As users migrate to VDSL, the higher connection speeds is expected to drive additional growth in throughput above the underlying bandwidth growth and an adjustment to the average throughput per end-user is made for that technology.

535 This assumed level of growth is consistent with the forecasts of annual growth in end-user demand undertaken by the following agencies:

535.1 Nielsen's Law of Internet Bandwidth (50% compound annual growth rate (**CAGR**) – User's bandwidth grows by 50% per year. The law fits data from 1983 to 2014);

535.2 Commerce Commission *Annual Telco Monitoring Report 2013* (55% CAGR – Average monthly data used by each fixed line broadband subscriber rose from 9 GB in 2009/10 to 26GB in 2012/13);

535.3 Statistics NZ – ISP Survey 2013 (60% CAGR - Monthly average data usage per connection increased from 9 GB in 2011 to 23 GB in 2013);[187]

535.4 IDC – Worldwide Internet Broadband Bandwidth Demand 2012-2015 Forecast (50% CAGR – For fixed broadband, bandwidth increase is projected at 50% every year for next 3 years);[188]

535.5 Cisco VNI (22% CAGR – Monthly average internet data usage per NZ household grow from 35.9 GB in 2013 to 95.6 GB in 2018). Busy Hour traffic growing faster than average traffic growth (32% vs 25%);[189]

535.6 IEEE Bandwidth Assessment Report (58% CAGR – IEEE predict a 10 fold increase in bandwidth over next 5 years);[190]

535.7 Cable Network Bandwidth trends (50% CAGR – Average downstream bandwidth per subscriber grew from ~16 kbps in 2004 to ~160 kbps in 2011);[191] and

535.8 Spark half year results (December 2013) (89% CAGR – Average data cap usage up 89% in last year to 34 GB).[192]

536 To determine the implications of this growth in average throughput per end-user for dimensioning the backhaul link between DSLAM and FDS, it is necessary to make assumptions in relation to the number of end-users connected to each DSLAM, and the level of utilisation of the first 1 GigE link at which a second link should be provisioned.

537 DSLAMS are deployed within both active cabinets and exchanges. Each DSLAM is technically able to serve 384 end-users (8 slots made up of 48 ports each). For

[187] Statistics New Zealand "Internet service provider survey 2013" (14 October 2013), available at http://www.nbr.co.nz/sites/default/files/images/ISPSurvey2013.pdf.

[188] FierceCIO "IDC: Future demand for network bandwidth is 'staggering' (20 March 2012), available at http://www.fiercecio.com/techwatch/story/idc-future-demand-network-bandwidth-staggering/2012-03-20.

[189] Cisco "Visual Networking Index: Forecast and Methodology" (10 June 2014), available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.html.

[190] IEEE 802.3 Ethernet Working Group "IEEE Industry Connections Ethernet Bandwidth Assessment" (19 July 2012), available at http://www.ieee802.org/3/ad_hoc/bwa/BWA_Report.pdf.

[191] Arris "Bandwidth Trends on the Internet… A Cable Data Vendor's Perspective" (September 2011), available at http://www.ieee802.org/3/ad_hoc/bwa/public/sep11/cloonan_01a_0911.pdf.

[192] Telecom "Telecom H1 FY14 Financial Results" (February 2014), available at http://investors.telecom.co.nz/FormBuilder/_Resource/_module/XZdfKzNUJ02K93habZUuMw/file/results/2014/Telecom-H1-FY14-Results-Presentation-FINAL.pdf.

cabinet-based DSLAMs, 7 out of the 8 slots are usually reserved for DSL end-user cards. The final slot is reserved for other uses, such as P2P links. This dimensioning is a result of space constraints within a cabinet, which generally can house only one DSLAM, meaning that the DSLAM must serve demand for all services. This means that the maximum number of customers served by a single cabinet based DSLAM is 336.

538 In contrast, the number of DSLAMs that may be housed in an exchange is effectively unlimited, so all 8 slots in an exchange based DSLAM can be filled with DSL end-user cards. P2P links can be provided from a different DSLAM.

539 The actual number of DSLAMs equipped in exchanges (and "sites" like Auckland Airport, which is not an exchange or a cabinet, but can have multiple DSLAMs) is a function of current demand. Chorus only adds a DSLAM chassis when it has run out of capacity, so all but the last DSLAM at an exchange is full. It has 384 working lines (or thereabouts).

540 A single 1 GigE link has a maximum transmission rate of 1000 Mbps per second. Best practice suggests that a second 1 GigE link should be added when the first link has reached 85% utilisation on average (i.e. 850 Mbps), to ensure that service levels are met at peak, making allowance for actual maximum throughput rate possible on an Ethernet link, and variability in actual traffic demand. As average throughput is measured on the basis of a 15 minute period, during that period the network will experience peaks when real-time throughput exceeds the average and troughs when real-time throughput is less than the average.

541 Adopting 85% utilisation provides a margin to ensure that the targeted average throughput is achieved over the 15 minute period. If the backhaul link is designed for 100% theoretical utilisation, in a 15 minute period traffic congestion will occur during peaks, meaning in practice the average throughput target will not be achieved. An 85% threshold also allows sufficient lead time to monitor capacity, order, construct and deploy additional backhaul capacity.

542 A single 1 GigE link serving the full 384 customers will reach 85% utilisation once throughput reaches 2.214 Mbps per customer (850 Mbps divided by 384 equals 2.214 Mbps). On current forecast growth, this is expected to occur sometime in the fifth year of the regulatory period. To meet expected throughput of **[RI:]** at the end of the fifth year, any fully provisioned DSLAM serving 384 customers will need to be able to serve **[RI:]**, well in excess of the 850 Mbps able to be served by a single 1 GigE link.

543 The implications of this issue may be significant. **[RI:**

544

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545 These DSLAMs will require a second 1 GigE backhaul link in Year 5 based on our current per-subscriber throughput forecast and with current demand. With higher subscriber demand or higher throughput demand, an even larger proportion of DSLAMs will require a second 1 GigE backhaul link by Year 5.

546 It is therefore likely that TERA's assumption that a single 1 GigE connection per DSLAM is incorrect, if the model were to reflect realistic growth in throughput over the regulatory period. Consequently, TERA should revise their model to explicitly dimension the number of backhaul links required for each DSLAM based on forecast subscriber and throughput demand.

FDS Interlinking dimensioning

547 In its model, TERA's assumptions regarding the number of ports per card slot do not appear to utilise the latest FDS technology, which is able to accommodate 48x1 Gbps links to access nodes or 10x10 Gbps links. **[RI:**

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548 The Commission should confirm that TERA have used appropriate unit costs for the latest FDS technology.

549 Once this correction is made, most notional FDS sites will require only a single subrack (physical switch). However, where more than one subrack is required at a FDS site, necessary inter-subrack links should be modelled. We explain the reason for this in more detail, below.

550 The Commission has modelled parallel subracks within a FDS site, with no allowance for interconnection between the subracks (see Figure G2, below). This approach determines the number of FDS subracks based only on the number of ports required for connectivity to DSLAMs (1 Gbps) and RSPs/REN (10 Gbps).

Figure G2: Commission's approach to modelling FDS

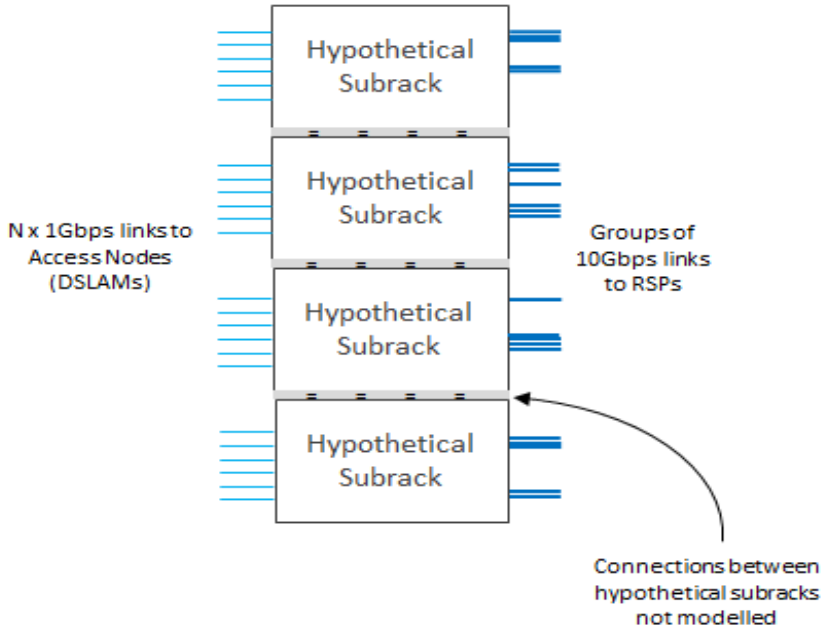
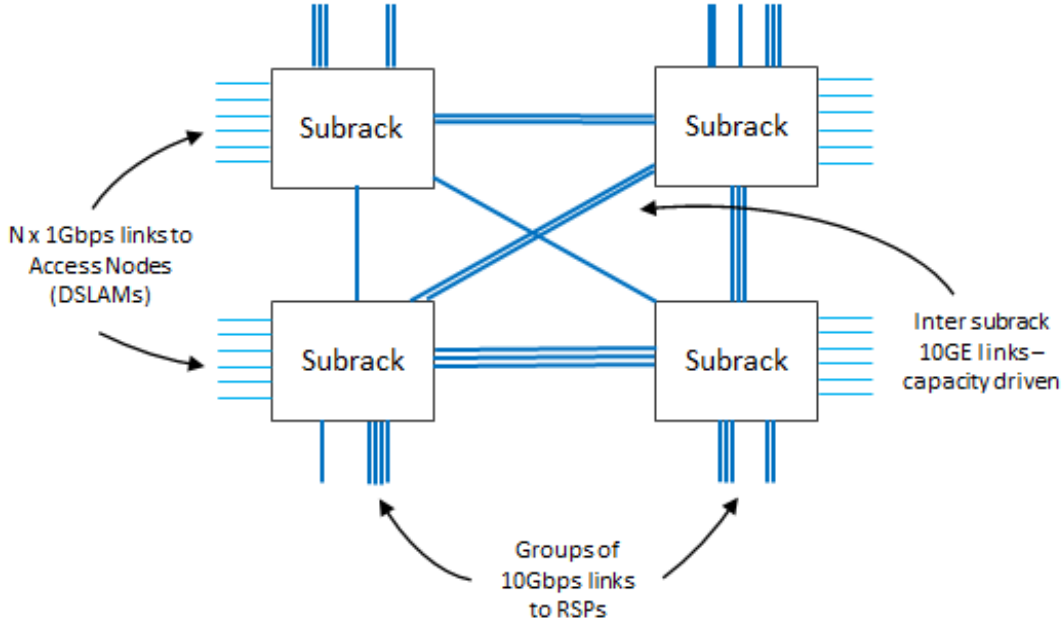


Figure G3: Appropriate interlinking dimensioning between multiple physical switches



551 Where more than one subrack is required, it is necessary for each subrack to link with the others. If the subracks are not interconnected, an end-user connected to one subrack cannot connect to an RSP connected to another subrack. The more subracks, the greater the number of links interconnect the subracks (see Figure G3 above).

552 Inter-subrack links become increasingly important as total throughput demand increases as they are capacity dependant. As traffic increases, more inter-subrack links are required, reducing the number of ports available on each subrack for DSLAM or RSP/REN connections.

553 Consequently, the number of FDS ports and FDS subracks modelled will be dependent on factors, each of which is dependent on the throughput in the network:

553.1 the number of ports connected to DSLAMs;

553.2 the number of RSP/REN handover links; and

553.3 the number of inter-subrack links.

554 When the total number of ports required exceeds the capacity of a single FDS subrack, provision should be made for 10 GigE inter-subrack links. The number of links required will be a function of the following factors:

554.1 the aggregate throughput to and from subtending DSLAMs, which increases over time;

554.2 the number of FDS subracks required to provide the number of ports required (including inter-subrack links); and

554.3 additional inter-subrack links required for resilience.

555 For the purposes of modelling inter-subrack links, ports and traffic can be assumed to be distributed evenly between subracks. The traffic between any pair of subracks is then the total traffic divided by the number of subracks. The number of links required between any pair of subracks will be determined by the number of 10 GigE links required to carry that volume of traffic at no more than 85% utilisation. The number of subrack pairs (and hence sets of inter-subracks links) is ½*N(N-1), where N is the number of subracks. An additional port per subrack should be provisioned for additional links required for resilience.

556 This calculation is arithmetically straightforward, however it does introduce some modelling complexity in that it is an iterative calculation – the number of inter-subrack links is a function of the number of subracks, which in turn is a function (in part) of the number of ports required for inter-subrack links.

APPENDIX H: WACC AND RELEVANCE OF ASYMMETRIES

557 This Appendix responds to common issues in the Commission's draft determinations for the UCLL, SLU and UBA services as they relate to WACC parameters and the account to be taken of asymmetry issues.

WACC

558 The determination of the WACC for UCLL and UBA services is a key input into the TSLRIC price. The cost of capital must be set at a level that provides the financial return investors would require given the risk of the investment in those services and that investors have alternative options (including as to the build/buy decision). We agree with the Commission that the starting point is NPV neutrality.

559 This objective aligns with section 18 considerations. In particular section 18(2A) directs consideration of the 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. We agree with the Commission that ensuring that businesses have incentives to invest is important for the promotion of competition for the long-term benefit of end-users, and that dynamic efficiency should be promoted over other efficiencies to properly promote section 18.[193]

560 We also agree with the Commission that regulatory predictability is important to support investment incentives. Again, section 18 underlines this goal. In the WACC context, this means:

560.1 as a starting point, taking a similar regulatory approach to determination of WACC parameters as has been taken for regulating other utilities under input methodologies (as the most recent and relevant regulatory precedent for the treatment of various WACC parameters and related WACC issues in electricity and gas sectors);

560.2 where individual WACC parameters and/or circumstances relating to the telecommunications sector require a departure from the input methodologies applied to the electricity and gas sectors, the Commission should have regard to consistency with its earlier approach to determining the cost of capital in the telecommunications sector; and

560.3 the application of an orthodox TSLRIC (as the best means of implementing section 18, which the legislative framework assumes TSLRIC will do).[194]

561 The application of orthodox TSLRIC requires an appropriate consideration of realistic forecasts of WACC parameters, demand and price trends. It must be forward looking in order to provide the statutorily-mandated incentives to promote efficient investment for the long-term benefit of end-users.

[193] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [131].

[194] In line with the Court of Appeal's decision in *Chorus v Commerce Commission* ([2014] NZCA 440), determination of a price path (be it an IPP or an FPP) in accordance with the statutory requirements is designed to implement the statutory purpose: CoA at [44] and [153]. In the case of the FPP, the Act anticipates this will be a forward looking TSLRIC model, as defined in Schedule 1.

562 With this in mind, we respond to the Commission's draft WACC determination in terms of the specific WACC parameters and reasonableness checks.

Parameters

563 We comment below on the key WACC parameters, namely asset beta,[195] gearing, and various inputs into the cost of debt.

564 We have also instructed CEG to review the Commission's draft decision on the cost of capital for providing the UCLL and UBA services, and in particular to:

564.1 assess the reasonableness of the Commission's estimate of the asset beta;

564.2 comment on specific aspects of the Commission's approach to estimating the cost of debt; and

564.3 undertake a comparison of the WACC allowed by the Commission against those allowed in other jurisdictions.

565 Our submissions below should be read in conjunction with CEG's 2015 WACC Parameters report.[196]

Asset Beta

566 We consider an asset beta of 0.5 is appropriate to set for the regulatory period. This is based on:

566.1 a review of average asset beta over a long period (the past 20 years) conducted by CEG using the methodology endorsed by the High Court on appeal from the Commission's input methodologies determinations. Applying the same methodology for Chorus will promote regulatory predictability and stability;

566.2 analysis that shows that the only time that betas have been at or below 0.4 is the period affected by the global financial crisis and European sovereign debt crisis. Since mid-2013 asset beta estimates have been above 0.4 (including for Oxera's preferred sample); and

566.3 the average beta determined in recent regulatory decisions in European countries – the most recent estimates have been around 0.5 (see Figure 1 in the CEG WACC Parameters paper).

567 The beta determination is designed to reflect an accurate measure of the level of systematic risk in the telecommunications access sector. In the context of TSLRIC pricing, the aim is also to set the asset beta at the level which is likely to reflect what is expected over the regulatory period.

568 There are two key issues in relation to estimating the asset beta the:

[195] We also note that there is a conceptual error in the formula used by the Commission to calculate equity beta. The Commission has, incorrectly, used "rounding" function in the formula, which has effectively reduced the final value of the WACC from 6.48% to 6.47%.

[196] CEG, "WACC parameters in the UCLL and UBA draft decision" (February 2015) at [40].

568.1 length of time covered in the benchmark sample of comparable businesses; and

568.2 composition of the countries and businesses included in the benchmark sample.

(a) LENGTH OF TIME

569 It is helpful to consider observed levels of beta over time for an indication of what might happen over the next 5 years. But the context and limits of any particular time period used to estimate asset betas need to be considered.

570 For example, it would be inappropriate to place emphasis solely on average values observed in the five year period 2007-2013 as this is heavily influenced by changes in the macro-economic environment, in particular the Global Financial Crisis and the European sovereign debt crisis. These factors are not expected to continue to have strong impact on asset betas observed in the telecommunications sector since financial stability in the Eurozone and elsewhere has improved significantly since 2012. Asset betas of most fixed access telecommunications firms have recently recovered from the global financial crisis and debt crisis and are returning to levels previously experienced prior to 2008.[197]

571 CEG have reviewed average asset betas over the past 20 years as well as the most recent observations of beta for the comparator sample assessed in Oxera's report,[198] to consider what is likely to be the appropriate beta to set for the regulatory period.[199] The approach proposed by CEG is based on empirical evidence which suggests that it is not reasonable to believe that beta for Oxera's comparator sample is expected to remain at levels observed over the Global Financial Crisis and European debt crisis, and which are not considered to be representative of future conditions. CEG's updated analysis suggests that current betas have recently returned to a level of around 0.50, consistent with the long run average of betas over the past 20 years. We believe that the asset beta measured against Oxera's comparator sample should be set at 0.50.

572 An asset beta of 0.5 is consistent with the value that Ofcom recently applied to Openreach, the most comparable fixed network operator to consider for beta because they are also an access network provider.

573 We note that the average value of asset betas for fixed access businesses determined in the recent regulatory decisions (UK, Ireland, Denmark and Belgium) is above 0.5, as shown in Figure H1 below.

[197] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015) at [39].

[198] Oxera "Review of expert submissions on the WACC for UCLL/UBA" (4 November 2014).

[199] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 2.1.

Figure H1: Asset betas – recent regulatory precedents

Country	Asset Beta	Date of regulatory decision
Ireland	0.55	December 2014
Denmark	0.50	December 2014
Belgium	0.60	May 2014
UK (Openreach)	0.50	April 2014
AVERAGE	**0.54**	

574 We also note that the revised range for regulatory determinations presented by Oxera in its report prepared for the Commission, dated 4 November 2014, should be amended to reflect more recent values for asset betas in the European benchmark proposed by Oxera and to correct an error in the value of the range given by Oxera.[200] Accordingly, the correctly revised range for regulatory determinations shown in Oxera's report is 0.39 to 0.6, and the average determination based on the most recent data should be revised upward in accordance with the increased asset beta values set by regulators in Belgium (from 0.44 to 0.6), Denmark (from 0.45 to 0.5) and Ireland (from 0.5 to 0.55).

575 The key difficulty with the Commission's asset beta estimate of 0.4 (which is based on Oxera's refined comparator sample) is that it is restricted to an analysis of comparator asset betas over a five year period ending in April 2014. An alternative time period presented by Oxera (two-year ending April 2014) suggested a different (higher) value of asset beta.

576 The focus on the particular period(s) chosen by Oxera (departing from the approach in the IMs context) is likely to bias the Commission's estimate of beta and lead to an inaccurate measure of the level of risk in the telecommunications sector.

577 The estimation issues evident with Oxera's approach can be largely overcome by having regard to both the long run average estimates of historical beta and also the most recent beta estimates available (for which an additional 7 months of data is now available – up to December 2014 – since Oxera compiled its sample up to April 2014).

578 CEG has conducted its analysis on this basis. The results provide clear support for an asset beta of 0.50 in current circumstances. An asset beta of 0.50 is also in line with international regulatory telecommunications fixed line asset beta decisions over the past five years, as highlighted in Table 3 of CEG's report.[201] The average regulatory determination based on the most recent data is higher than as determined by Oxera, to reflect the recent increased asset beta values set by

[200] Oxera has incorrectly reported the lowest beta in the range to be 0.38 which, according to Figure A1.1 in Oxera's report of 4 November 2014, refers to asset beta determined in the Netherlands. We note that the Dutch regulator has set an asset beta in July 2012 of 0.39 (and not 0.38). Accordingly, the correctly revised range for regulatory determinations shown in Oxera's report is 0.39 to 0.6.

[201] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 2.2.

regulators in Belgium (from 0.44 to 0.60), Denmark (from 0.45 to 0.50) and Ireland (from 0.50 to 0.55).

(b) COMPARATOR SAMPLE

579 In addition, there are some underlying issues with Oxera's comparator set which come into play in particular in the context of the estimation of the appropriate level of gearing (considered below). We put forward a further refined comparator set in our discussion of gearing. The refined set should be used in the asset beta context also (to the extent that the Commission declines to adopt the CEG comparator set).

580 We refer the Commission to the CEG 2015 WACC Parameters paper[202] for more detailed analysis, including of the difficulties in the Oxera approach.

Gearing

581 The Commission should give greater weight to considering the gearing of fixed line telecommunication businesses. The approach of ACCC and Ofcom, as well as most of the European regulators, has been to set the benchmark gearing based on the gearing of the regulated businesses. For integrated firms, where appropriate, regulators set different gearing between fixed and mobile businesses.[203] These considerations suggest that an appropriate gearing for UCLL and UBA in NZ is 50%.

582 Chorus is concerned that the regulatory risks involved in specifying the appropriate level of gearing for UCLL and UBA on the basis of values observed in a set of comparator firms, where such values differ significantly from the actual values of the regulated entity (Chorus). The Commission should follow the best practice in alleviating such regulatory risks before making a decision on whether to set the level of gearing (and asset beta) on the basis of actual values observed for the regulated entity or using a comparator set.

583 For example, regarding the appropriate level of gearing, the approach adopted by Ofcom is that: [204]

> In the past our approach to gearing has been to assume an optimal level of gearing, which we took to be 35% for BT Group. We re-levered the asset beta to this optimal gearing rate, and calculated what equity beta would be implied at 35%.
>
> This approach was appropriate when BT's observed gearing was below the optimal gearing, and it was clear that the capital structure was not optimal for BT Group. However, an optimal gearing approach is less appropriate when observed gearing is above the optimal level.

[202] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 2. See also CEG "Response to Commerce Commission UCLL/UBA WACC Consultation Paper" (March 2014).

[203] See for example IBPT "Projet de decision du Conseil de l'IBPT concernant le cout de capital pour les operateurs disposant d'une puissance significative en Belgique" (12 May 2014), at page 5. Available at http://www.bipt.be/public/files/fr/21245/Consultatie%20FR.pdf.

[204] Ofcom "Charge control review for LLU and WLR services" (31 March 2011) at [A12.82]-[A12.83], available at http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/annexes/wlr-cc-annexes.pdf.

584 Oxera has estimated Chorus' observed gearing at 62%. This is significantly above the Commission's proposed level of gearing of 43%, which is based on values observed in a set of comparator firms. Consistent with the approach taken by Ofcom, we consider the proposed level of 43% is inappropriate given Chorus' level of observed gearing.

585 To the extent use of a wider comparator set is considered desirable, we have reviewed the methodology, assumptions and results of the "refined comparator set" presented in Oxera's report, insofar as the Commission has relied on the values observed in the comparator set in reaching its view on the appropriate level of gearing. Our refined methodology, explained in more detail below, shows that an average value of appropriate gearing for UCLL and UBA is 50%.

586 Oxera's refined comparator set shows the values of observed leverage of comparator firms, calculated on the basis of both two-year leverage and five-year leverage estimates. The overall average for its refined comparator set is estimated at 47% and 43% respectively. Despite Oxera's analysis (including on the relationship between the two-year values and the Standard and Poor's credit rating), the Commission has decided to set its regulated level of gearing based on the estimated values for five-year leverage only.

587 Oxera's refined comparator set requires significant further refinement to be of real value in this process. The comparator set should be improved, with a number of firms excluded to better reflect the risks a hypothetical efficient fixed line operator faces to provide a more accurate estimate of asset beta and gearing.

588 In order for a comparator firm to remain in the comparator set, additional analysis needs to be performed to validate the reasonableness of the comparator firm's observed level of gearing (measured as market debt to capital ratio, and presented as such in Oxera's refined comparator set).

589 We have considered two methods for testing the reasonableness of the comparator firm's observed level of gearing:

589.1 comparing the comparator firm's observed level of gearing with the level of gearing specified by the relevant regulator, when applicable. Where the comparator firm's observed level of gearing is significantly different from the level of gearing specified by the regulator, the comparator firm is excluded from the comparator set; and/or

589.2 comparing the comparator firm's observed level of gearing (measured as market debt to capital ratio) with its book debt to capital ratio. Where the comparator firm's market debt to capital ratio is significantly different (more than 50% higher (or lower)) from its book debt to capital ratio, the comparator firm is excluded from the comparator set.

590 In terms of the first method, although some firms in Oxera's refined comparator set appear to have very low observed levels of gearing, their leverage specified by the relevant regulators in determining the regulated cost of capital has been set at a significantly higher level.

591 For example, Oxera's refined comparator shows Belgacom's observed two-year leverage of 20% and five-year leverage of 18%, albeit the IBPT (Belgian telecom regulator) has set Belgacom's leverage at a significantly higher level (noting that Belgacom's observed level of gearing measured as market debt to capital ratio has been significantly below optimal level). In addition, the IBPT has determined that the level of gearing for Belgacom's fixed network business should be set at a higher level than Belgacom's mobile network business (respectively 47.3% and 27.5%).[205]

592 A further example is Telstra's observed level of gearing in Oxera's refined comparator sample. This has been estimated at 18% for two-year leverage and 23% for five-year leverage. However, the ACCC has regularly determined a higher level of gearing in its determination on the cost of capital relevant to Telstra's fixed network access services. In fact, the ACCC has noted that: [206]

> Ovum's analysis of Telstra's accounts as part of the ACCC's assessment of the ULLS undertaking found an average level of 34 per cent debt to 66 per cent equity across its entire business. However, the ACCC considered that the CAN was less risky than Telstra's other operations (such as mobiles) and therefore should be able to service more debt. Telstra's debt ratio at the time of privatisation was 41.3%, when it more closely resembled a pure fixed line service operator. The ACCC therefore used a debt/equity ratio of 40:60 in the September 2010 Draft Report, as an appropriate gearing level for the CAN assets.

593 In terms of the second method, where a business has materially lower market gearing than book gearing, this reflects high market to book valuation of equity. That is, the market value of equity is materially in excess of the book value. This suggests that the firm is earning abnormally high profits on its physical assets. There are two possible explanations for this. The first is that it is exploiting a monopoly position, and the second is that it has substantial non-physical assets, such as a mobile subscriber base, which the market is valuing at a high level. Neither of these explanations apply to the UCLL/UBA provider being costed under TSLRIC and, consequently, these firms should be excluded from the sample.

594 The results of our reasonableness test on the second method (comparing the value of book debt to capital ratio with the market debt to capital ratio) are presented in Figure H2 below.

[205] IBPT "Projet de decision du Conseil de l'IBPT concernant le cout de capital pour les operateurs disposant d'une puissance significative en Belgique" (12 May 2014) at page 5, available at http://www.bipt.be/public/files/fr/21245/Consultatie%20FR.pdf.

[206] ACCC "Public inquiry to make final access determinations for the declared fixed line services" (21 April 2011) at page 98, available at https://www.accc.gov.au/regulated-infrastructure/communications/fixed-line-services/fixed-line-services-final-access-determination-fad-2011/discussion-paper.

Figure H2: Reasonableness test applied on Oxera's refined comparator set

Company Name	Book Debt to capital ratio	Market Debt to capital ratio	Difference between Book debt to capital and Market debt to capital ratios	Relevant or Exclude	Oxera 2-year leverage
AT&T, Inc. (NYSE:T)	52.84%	34.26%	54%	Exclude	
Belgacom SA (ENXTBR:BELG)	40.88%	23.12%	77%	Exclude	
BT Group plc (LSE:BT.A)	NA	33.69%		Exclude	
CenturyLink, Inc. (NYSE:CTL)	57.11%	54.18%	5%	Relevant	49%
Chorus Limited (NZSE:CNU)	76.00%	76.49%	1%	Relevant	62%
Cincinnati Bell Inc. (NYSE:CBB)	NA	78.20%		Exclude	
Deutsche Telekom AG (DB:DTE)	66.47%	53.03%	25%	Relevant	49%
Elisa Oyj (HLSE:ELI1V)	60.92%	29.27%	108%	Exclude	
Fairpoint Communications, Inc. (NasdaqCM:FRP)	NA	76.16%		Exclude	
Frontier Communications Corporation (NasdaqGS:FTR)	68.05%	64.16%	6%	Relevant	64%
Hawaiian Telcom Holdco, Inc. (NasdaqGS:HCOM)	51.84%	50.39%	3%	Relevant	51%
Hellenic Telecommunications Organization SA (ATSE:HTO)	61.95%	45.82%	35%	Relevant	48%
Iliad SA (ENXTPA:ILD)	47.84%	15.91%	201%	Exclude	
Koninklijke KPN N.V. (ENXTAM:KPN)	73.95%	60.56%	22%	Relevant	58%
Orange (ENXTPA:ORA)	62.46%	63.51%	2%	Relevant	56%
Portugal Telecom, SGPS S.A. (ENXTLS:PTC)	81.63%	79.73%	2%	Relevant	68%
Swisscom AG (SWX:SCMN)	65.14%	28.10%	132%	Exclude	
TDC A/S (CPSE:TDC)	58.96%	40.51%	46%	Relevant	39%
Telecom Italia S.p.A. (BIT:TIT)	65.19%	74.43%	12%	Relevant	78%
Telekom Austria AG (WBAG:TKA)	69.05%	58.36%	18%	Relevant	56%
Telstra Corporation Limited (ASX:TLS)	58.49%	22.17%	164%	Exclude	
Verizon Communications Inc. (NYSE:VZ)	54.74%	43.72%	25%	Relevant	25%
Windstream Holdings, Inc. (NasdaqGS:WIN)	91.93%	67.17%	37%	Relevant	63%
				AVERAGE	55%
				MEDIAN	56%

Source Damodaran Online,[207] Oxera,[208] Chorus

595 The average level of gearing in the comparator set is estimated at around 55%. This supports our view that assumed gearing of 50% is appropriate for the calculation of WACC for UCLL/UBA.

Cost of debt

596 A number of parameters in the cost of debt equation need to be refined to ensure that the Commission's cost of debt estimate accurately reflects the likely real cost of debt experienced by a business providing services required under the STDs for New Zealand over the regulatory period. In particular, we refer to the risk free rate, credit rating, debt risk premium and defining an efficient debt management strategy.

[207] For values observed under "Book Debt to capital ratio" and "Market debt to capital ratio". Data retrieved on 9 December 2014 from http://people.stern.nyu.edu/adamodar/.

[208] For values observed under "Oxera 2-year leverage".

(a) RISK FREE RATE

597 The Commission has not adequately taken into account the risk of significant changes in the estimated value of the risk-free rate over the entire regulatory period. This risk has the potential to fundamentally impact the estimated cost of capital for the UCLL and UBA pricing reviews.

598 The risk free rate should be calculated by reference to averaging periods significantly longer than the one-month average for Government five-year bond yields currently proposed by the Commission. One month averaging is inconsistent with the period considered in order to estimate the asset beta and is not appropriate due to the high volatility in Government bond yields since the financial crisis of 2008 (in which rates have fluctuated from a minimum of 2.6% to a maximum of 7.3%).

599 The Commission should estimate the risk-free rate on the basis of average values observed for different time periods, ranging from spot-rate to 5 year average.[209] This approach was adopted by the Commission in the telecommunications context in its Decision 672, and provides a more appropriate and predictable WACC estimate.[210] This is consistent with international regulatory precedent where regulators have, in the context of unusually low risk free rates recently, typically set a risk free rate in decisions that is materially above the prevailing risk free rate (see Figure 8 of the CEG WACC Parameters report).

600 In similar recent processes, the Commission has stated that "*Debt premium on corporate bonds, and the risk-free rate, are continually changing. Therefore the timing of when these rates are determined for the purposes of estimating the cost of capital could have a material effect on the estimate.*"[211]

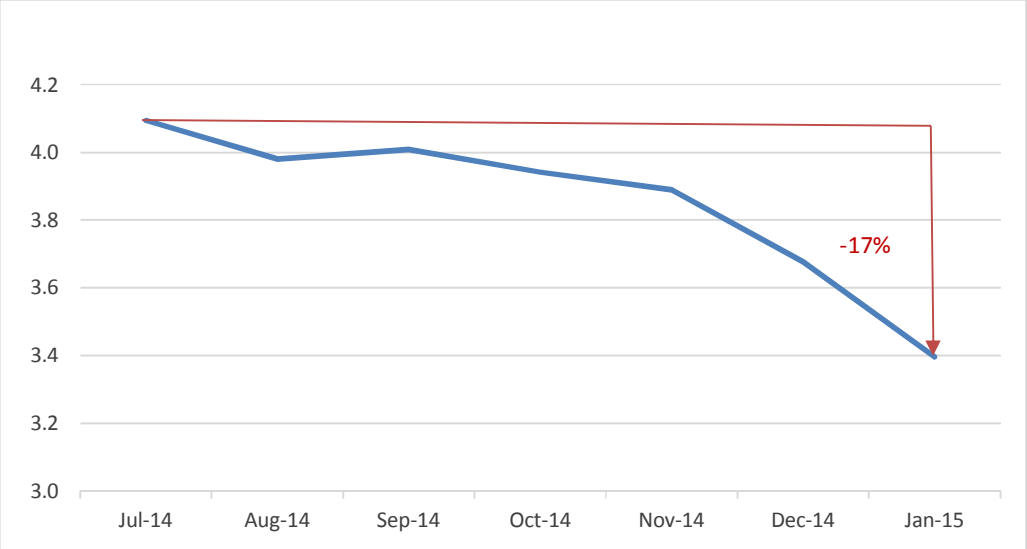
601 We agree. The timing of the calculation of one-month average is likely to create significant disparity in the risk-free rate over a relatively short period of time. Should the Commission calculate the risk-free rate based on one-month average observed in January 2015, the revised risk-free rate would be approximately 17% lower than the risk-free rate calculated in the Commission's draft determination, as illustrated in Figure H3 below.

[209] Commerce Commission "Standard Terms Determination for the designated services for Telecom's unbundled copper local loop network service (Sub-loop UCLL), Telecom's unbundled copper local loop network co-location services (Sub-loop Co-location) and Telecom's unbundled copper local loop network backhaul service (Sub-loop Backhaul)" (18 June 2009).

[210] Commerce Commission "Standard Terms Determination for the designated services for Telecom's unbundled copper local loop network service (Sub-loop UCLL), Telecom's unbundled copper local loop network co-location services (Sub-loop Co-location) and Telecom's unbundled copper local loop network backhaul service (Sub-loop Backhaul)" (18 June 2009).

[211] Commerce Commission "Input methodologies (electricity distribution and gas pipeline services) reasons paper" (22 December 2010) at [H5.69.], available at http://www.comcom.govt.nz/dmsdocument/5934.

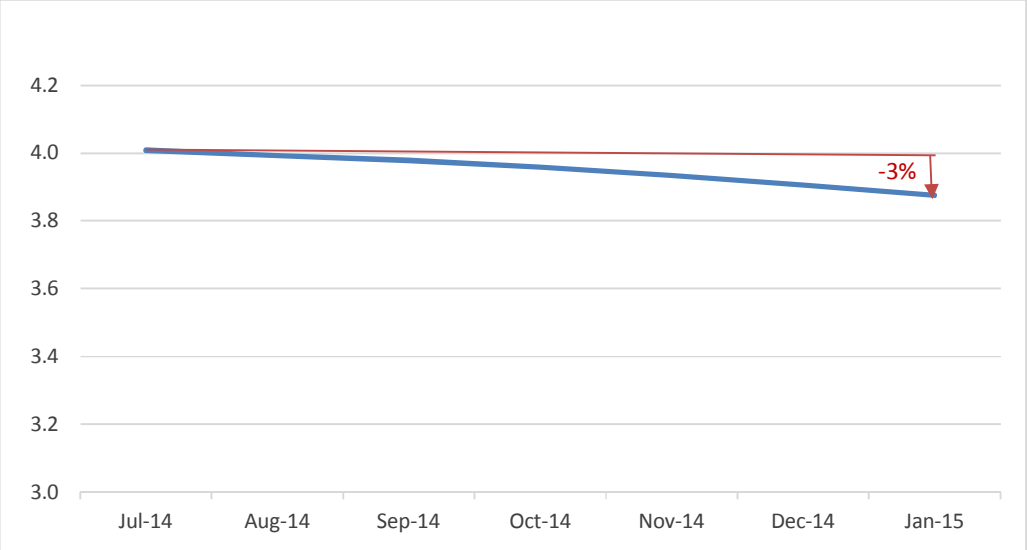
Graph H3: One-month average in 5 year government bond yields



Source: Reserve Bank, Chorus

602 On the other hand, should the Commission calculate government bond yields based on five-year average, the difference between the observed averages in January 2015 and July 2014, would be significantly reduced, as shown in Figure H4 below.

Graph H4: Five-year average in 5 year government bond yields

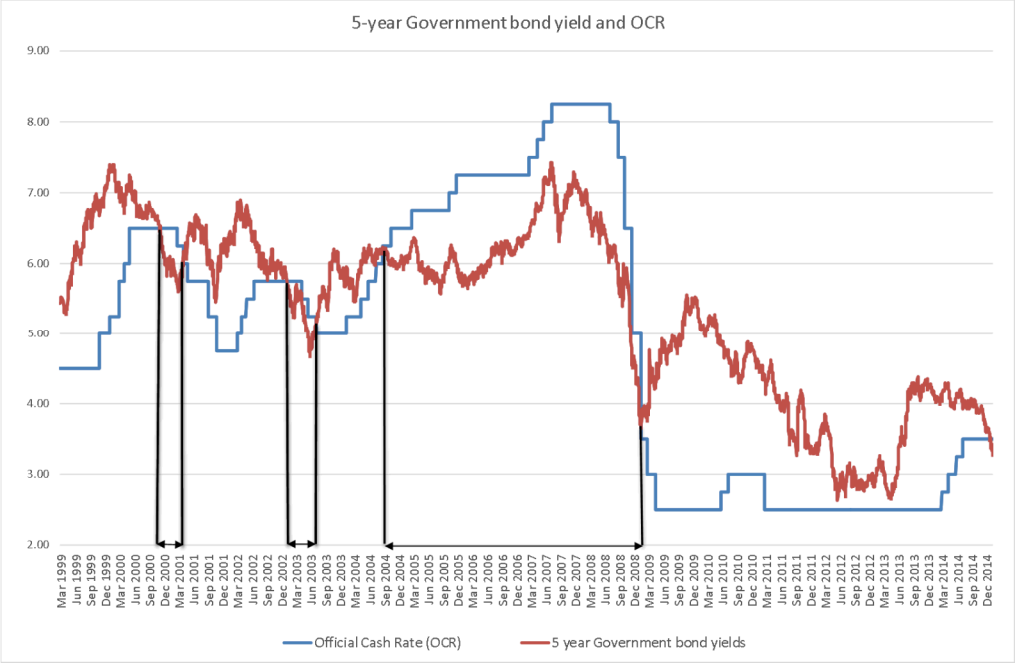


Source: Reserve Bank, Chorus

603 We note that the market yields on the 5 year government bonds have been particularly volatile since the financial crisis in 2008, with the movement in yield values between 2.6% and 7.3%. We also note that the volatility in yield values is

correlated (correlation coefficient 0.81) with the movement in the Reserve Bank's Official Cash Rate (OCR), as illustrated in Figure H5 below.

Figure H5: Long-term trend in OCR and government bonds



Source: Reserve Bank, Chorus

604 While for most of the time the 5 year government bond yields were higher than the OCR, there were three periods prior to January 2015 (two short periods of up to six months in 2000/2001 and 2003, as well as one long period between September 2004 and January 2009) where the OCR was higher than the 5 year government bond yields. However, in all the three periods, both the OCR and the 5 year government bond yields were following the same trend, either increasing or decreasing.

605 We note that as of January 2015, the OCR has surpassed again the 5 year government bond yields, and the gap continues to widen.

606 Given the impact the OCR has on the expectations of a buyer of a security in the current market, i.e. on the expected government bond yield values, and considering that the situation where the OCR is lower than the 5 year government bond yields is unsustainable over long period of time, it can be reasonably assumed that the risk-free rate is likely to increase within the regulatory period for UCLL and UBA pricing reviews as against when measured by the Commission in accordance with its proposed approach of averaging the observed market yields on the government bonds over one calendar month prior to issuing the final decision.

607 For the reasons above, we believe the Commission should depart from the approach adopted in the input methodologies for electricity and gas sectors, where the Commission calculates the risk-free rate based on one-month average

for 5 year government bond yields observed as close as possible to the final decision.

608 We consider the Commission's approach implemented in its Decision 672 is more appropriate, whereby the Commission estimated the risk-free rate on the basis of average values observed for different time periods, including the 5 year average.

(b) CREDIT RATING

609 Based on the CEG comparator group, and taking account of the practice of regulators such as ACCC and Ofcom, the Commission should use a credit rating of BBB-.[212]

610 Oxera is incorrect that the link between credit rating and leverage ratio across the comparator sample is relatively weak, thus suggesting that credit rating and gearing level are unrelated. This is illustrated by a recent report issued by Moody's[213] which shows that the higher the credit rating of a telecommunications firm, the lower its debt/book capitalisation. Figure H6, below, demonstrates the point:

Figure H6: Credit rating and gearing

Debt/Book Capitalization	Aaa	Aa	A	Baa	Ba	B	C
Telecommunications	0.16195	0.3543	0.43785	0.5058	0.5275	0.7436	1.15495

Source: Moody's

(c) DEBT RISK PREMIUM (DRP)

611 The Commission should include the bonds issued in 2014 by Genesis Power Limited, Mighty River Power Limited and Meridian Energy Limited in its benchmark sample for estimating the DRP. On this basis, the Commission's estimate of DRP should be increased by between 0.07% and 0.16%.[214]

612 CEG agrees with the Commission that the bonds issued by these three firms were affected by the "New Zealand Power" proposal in 2014. However, CEG considers that the effect on these issuers' bonds (an increase in the DRP on each firm's bonds as a result of the possibility of a devaluation of assets through regulatory change) is particularly relevant for an access provider facing regulation under TSLRIC in New Zealand. The regulatory risks faced in each case are the same – a possible devaluation of assets through regular regulatory decision-making.[215] Thus, the Commission's basis for the exclusion of these bonds when determining the DRP for the cost of capital for the UCLL and UBA pricing reviews is flawed.

[212] CEG "Response to Commerce Commission UCLL/UBA WACC consultation paper" (March 2014) at [16], [102], and [104].

[213] Moody's Financial MetricsTM "Key Ratios by Rating and Industry for Global Non-Financial Corporations" (December 2010).

[214] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.2.

[215] CEG, "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.2.

(d) DEFINING AN EFFICIENT DEBT MANAGEMENT STRATEGY

(i) Debt swap costs

613 Any estimate of the cost of debt should reflect the costs of an efficient debt management strategy. A reasonable estimate of the direct costs of entering swap contracts is between 10 and 13 basis points if the debt can be raised domestically and more if some debt is raised overseas. There will also be other indirect costs associated with risks created through this process.[216]

614 Our assessment reflects:

614.1 that two swap contracts (rather than one) must be taken out to achieve the hedging benefits that the Commission assumes in its draft determination; and

614.2 information on the costs of swap transactions provided by a recent reports submitted in recent regulatory proceedings in Australia which have considered the achievability of the cost of debt benchmark.[217]

615 The detailed reasoning and basis for the calculation is set out in section 3.4 of the CEG WACC Parameters paper.

(ii) Benchmark term

616 The appropriate benchmark term for calculating the cost of debt is 10 years. This is consistent with the debt raising practice of a wide sample of international telecommunications firms. In particular, CEG notes that the Commission's preferred benchmark sample for estimating asset beta is comprised of a sample of international telecommunications firms similar to that for which CEG estimate a debt term of 10.7 years.[218]

(iii) Debt issuance costs

617 Debt issuance costs of at least 0.35% per annum (on a conservative estimate) should be used over a 7 year term. The Commission's allowance of 0.25% per annum is too low. Over a 10 year term, the Commission should use debt issuance costs of at least 0.28% per annum.

618 These estimates are based on our expert's advice that a cost of capital should be applied to amortise upfront (non-recurring) debt issuance costs over time.[219] In its draft decision the Commission appears to have implicitly (incorrectly) assumed a cost of capital of 0% for this purpose.

(e) CONSISTENCY BETWEEN TAMRP AND RISK FREE RATE

[216] CEG, "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.4.

[217] CEG "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.4.

[218] CEG, "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.3.

[219] CEG, "WACC parameters in the UCLL and UBA draft decision" (February 2015), section 3.1.

619 If a prevailing risk free rate is used to populate the CAPM then the TAMRP and risk free rate should be estimated concurrently over the same time period and in the same market conditions to arrive at a reasonable cost of equity. [220]

620 It would be problematic to estimate a cost of equity combining the TAMRP from the input methodologies process with the current risk free rate as this would underestimate the cost of equity in current market conditions.[221]

Recognising asymmetries

621 The Commission should include an uplift to its best estimate of the WACC and TSLRIC price for the UCLL and UBA services to address the asymmetric consequences of setting the WACC and other inputs into the TSLRIC price determination too high or too low. The asymmetries arise due to uncertainty in estimation of a range of inputs, and a failure to properly account for asymmetric risk.

622 As the Commission acknowledges, investment incentives which are central to section 18 considerations are affected by both:

622.1 the asymmetric costs of getting the TSLRIC calculation - and within that both the WACC measurement and a range of other inputs into TSLRIC - wrong as a matter of estimation error; and

622.2 a range of asymmetric risks - including asset stranding and demand risk not otherwise addressed in the calculation of TSLRIC - which if not recognised can lead to an underestimation of the TSLRIC price, with asymmetric negative welfare consequences.

623 As CEG explains, in the context of TSLRIC regulation of the UCLL and UBA services, the asymmetric consequences of setting WACC too high or too low are important, and this contributes to the uncertainty in the price. As the true WACC is unobservable, the estimation of WACC is inherently uncertain. The Commission has previously acknowledged in the context of setting the WACC for EDBs and GPBs that:[222]

> In exercising our judgement, we consider some conservatism in selecting the percentile (i.e., erring on the high side) remains appropriate. Doing so recognises there is fundamental uncertainty regarding the appropriate WACC percentile, and that the long-term costs to consumers of under- and over-estimating the WACC are asymmetric. Therefore, erring on the high side is likely to be in consumers' interests. Doing so reflects otherwise unquantified (or unquantifiable) factors that are likely to result in greater benefits to consumers in the long term, in terms of efficient investment and innovation that meets current and future consumers' demand at the quality that they want…

624 Given the uncertainty, most international regulators present a range for WACC or key parameters in their calculations.[223] By failing to address at least estimation

[220] CEG "Response to Commerce Commission UCLL/UBA WACC consultation paper" (March 2014) at [32].

[221] CEG "Response to Commerce Commission UCLL/UBA WACC consultation paper" (March 2014) at [36] and section 6.

[222] Commerce Commission "Amendment to WACC percentile" (30 October 2014) at [2.39].

[223] Commerce Commission "Amendment to WACC percentile" (30 October 2014) at [5.44].

error in setting the WACC, the Commission would ignore the fact that setting the WACC at the midpoint estimate will only result in NPV neutrality around half the time. In order for an investor to earn a normal return/mid-point WACC over the regulatory period, the Commission needs to consider a higher return than the mid-point WACC.

625 This is particularly important in the context of the price setting where the WACC is to be set for at least the next 5 years, based on the draft determinations' proposed regulatory period. It is unlikely that the WACC parameters would remain the same over the 5 year period or that investors will expect market conditions to remain the same as the market conditions that exist today.

626 However, the uncertainty in estimating a TSLRIC price is not limited to simply the WACC parameters. There are also a wider set of asymmetric consequences from setting the price too low which are independent of how the WACC is determined. Other inputs include the cost of building the modelled network, the cost of operating and maintaining the network, demand and asset lives and price trends of the network.

627 These asymmetries can be addressed through an uplift to the WACC and overall TSLRIC price.

CEG's analysis

628 We asked CEG to consider the Commission's draft determination to *not* uplift the WACC or TSLRIC price for the UCLL service. CEG's analysis supports the Commission's view that there are asymmetric consequences (or asymmetric costs) stemming from setting UCLL and UBA prices too low, relative to setting them too high. Its view is that the Commission should apply an uplift to the UCLL and UBA prices to minimise the expected costs to society of misestimating the costs of providing these services. In reaching this view, CEG recognises that these asymmetric costs stem from the fact that underestimated prices for UCLL and UBA would:

628.1 provide weaker incentives for Chorus to continue to maintain and invest in its copper network in the long run; and

628.2 send signals that are likely to impede the migration of customers from copper based services to fibre based services, and reduce the incentives for Chorus and LFCs to invest in their UFB networks. We note that, by the end of the regulatory period, the aggregate UBA price proposed in the draft determination will be significantly below entry level UFB prices (which will be $42.50/month).

629 CEG considers that these effects could in turn affect the welfare benefits stemming from investment in fibre in circumstances where not just the effect on Chorus' incentives to invest that must be considered in setting prices, but also the incentives of its competitors (or potential competitors) to invest.

630 CEG also considers that there are cash flow asymmetries (or asymmetric risks) that motivate an uplift to the TSLRIC price. In particular:

630.1 the compensation allowed by the Commission for catastrophic risk is not complete and Chorus will not be compensated in expectation for these residual risks;

630.2 the Commission proposes not to provide compensation for potential regulatory stranding due to regular revaluations of the asset to the assumed MEA; and

630.3 technological and competitive standing risks are not compensated in the draft determination.

631 The CEG paper sets out the rationale for an uplift in the price of the regulated service to address both asymmetric costs and asymmetric risks of a lower price. It illustrates the uncertainty in key parameters including the WACC, asset lives and asset price trends, and describes a methodology the Commission could implement to quantify the effect of this uncertainty in a range in prices of the regulated service (i.e., Monte Carlo simulation). We urge the Commission to undertake the necessary analysis in this regard.

632 CEG disagrees with the conclusions drawn by Professor Vogelsang, and accepted by the Commission, that uplifting the price is not warranted since the modelling adopted by the Commission has elements that already favour a higher price.[224]

Professor Hausman's analysis

633 We also asked Professor Jerry Hausman of MIT to consider Professor Vogelsang's paper and the Commission's approach to the questions of whether to apply an uplift to the WACC (and/or the price) derived by applying TSLRIC, concentrating particularly on:

633.1 the Commission's analysis of the asymmetric consequences of estimation error; and

633.2 the conclusions reached by Professor Vogelsang on uplift, particularly in relation to the implementation of TSLRIC in telecommunications pricing.

634 Professor Hausman's evidence[225] is that there is a strong case for an uplift to the regulatory WACC or the final price point in order to address the asymmetric costs of underestimating TSLRIC (whether these arise through estimation error or as a result of a failure to take account of asymmetric risks from sunk and irreversible investments). His analysis is framed in terms of an uplift as a means of mitigating the asymmetric negative consequences on investment of applying TSLRIC pricing, which the evidence shows leads to asymmetric returns.

635 Professor Hausman's review of the evidence highlights that there are large welfare gains to consumers and business end-users from investment in new and improved telecommunications services, but that TSLRIC access pricing can discourage such investment to the extent it leads to asymmetric returns that is, all risk – from

[224] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 5.

[225] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015).

sunk and irreversible investments and potential technological obsolescence – on the access provider, without corresponding reward.

636 Professor Hausman's analysis leads him to conclude that the Commission's usual rationale for a WACC uplift applies in the UCLL and UBA access pricing context. Professor Vogelsang's reasons for nevertheless not applying an uplift ignore significant academic thinking regarding the (overall negative) effect of TSLRIC pricing on investment incentives. We refer the Commission to the Hausman paper in full.[226]

637 The short point is that Professor Vogelsang's assumptions of generosity (on which the decision to not apply any kind of uplift are primarily based) are incorrect. For every potential "generosity" in the Commission's parameter estimations (many of which are not generous at all), there is a parameter or decision that impacts negatively on the WACC or TSLRIC price. The negative welfare consequences from underestimation for any reason are not mitigated by an exercise of cancelling out. The Commission should not discount the need to mitigate against the asymmetric risks and negative consequences of underestimation in this case.

Section 18, predictability and investment incentives

638 The section 18 investment and innovation imperatives make an uplift essential. Section 18 supports adopting predictability as an objective. Predictability supports investment incentives which in turn supports competition for the long-term benefit of end-users. Ensuring businesses have incentives to invest is important to the promotion of competition for the long-term benefit of end-users. We agree with the Commission that giving effect to regulatory predictability gives effect to section 18, especially section 18(2A). Predictability is best promoted here by adopting an internationally orthodox approach to TSLRIC.[227] And the legislative framework assumes TSLRIC will promote section 18.

639 Section 18 means that in exercising judgement in relation to TSLRIC (both as to the parameters and the final TSLRIC price) the Commission must have regard to efficiency and the long term benefit of end-users. It must also have regard to investment and innovation incentives. We agree with the Commission that it is appropriate to give greater weight to dynamic efficiency incentives over static efficiency.[228]

640 Section 18(2A), added to the Act in 2011, emphasises that the Commission must give consideration to the 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. This requires the Commission to give consideration to investment incentives in selecting its price point from the range of prices that the orthodox TSLRIC calculation allows. This is important in the context of TSLRIC, as the academic thinking and empirical evidence on the ability of TSLRIC to incentivise investment has moved significantly since TSLRIC's inclusion in the Act in 2001 (in large part

[226] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015).

[227] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [131] and [132].

[228] Commerce Commission "Draft determination for UCLL" (2 December 2014) at [197].

due to recognition of a range of risks and uncertainties in the estimation process). Professor Hausman's evidence discusses this issue in detail.[229]

641 Setting the appropriate WACC and TSLRIC price to achieve financial capital maintenance is key to ensuring the Commission's section 18 obligations are met. The decisions to apply orthodox TSLRIC (and as such to not apply an alternative asset valuation to ORC for reused assets), and to not apply a performance adjustment to the FTTH MEA, reflect section 18 considerations of predictability and investment incentives and cannot be described as "generous". The UK and EU approach to TSLRIC is not the benchmark against which the Commission's approach should be judged as "generous" or otherwise, because these approaches are not forward-looking TSLRIC as required by the Act in New Zealand. The Commission's approach is simply orthodox on the basis of predictability. The decision to apply an uplift to WACC and/or the TSLRIC price, or not, must be made in this context.

Professor Vogelsang's analysis

642 Professor Vogelsang's framework for analysis contemplates a departure from forward-looking TSLRIC. His assumptions about generosities in the Commission's modelling in relation to asset valuation and performance adjustment and his views as to the adoption of conventional TSLRIC are incorrect as:

642.1 the legislative framework presupposes that TSLRIC is designed to meet the statutory objectives of section 18 and Part 2 of the Act (consistent with the approach taken by the Court of Appeal – refer above);

642.2 adopting an orthodox TSLRIC is consistent with regulatory predictability and therefore promotes section 18;

642.3 many of the Commission's draft assumptions in its model are not achievable in reality (e.g. pole design and costs, efficiency cuts in Opex, trenching costs and demand forecasts with LFC demand included) and therefore the particular approach taken by the Commission is certainly not generous, as recognised by Professor Hausman[230] and CEG[231]; and

642.4 the assumptions as to the considerations covered by asset lives and the insurance provided for catastrophic events are inadequate to offset the asymmetric risk associated with investment in telecommunications access services.

643 In particular, Professor Vogelsang appears to consider the Commission's approach to its TSLRIC modelling is generous on the (mistaken) comparison with the UK and EU regulators which no longer adopt TSLRIC due to specific circumstances found in those countries.

[229] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015), sections IV and VI.

[230] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [67].

[231] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 5.3.

644 He reasons that, in contrast to the UK and EU adaptations of TSLRIC, the Commission's adoption is generous in relation to its decisions relating to:

644.1 the valuation of reusable assets; and

644.2 use of a FTTH MEA without a performance adjustment.

645 CEG has advised that these modelling choices were necessary in order to be consistent with setting a price based on 'forward-looking costs', as required by the definition of TSLRIC. Professor Vogelsang's advice is based on a false premise that the Commission should offset arguments in favour of a higher price with these modelling choices, when the Commission was simply implementing TSLRIC in line with statutory requirements.[232]

646 The assumption in relation to reusable assets represents application of an orthodox approach to TSLRIC. This contrasts with the situation in the UK where Ofcom has applied a hybrid historic and current cost accounting with fully allocated costs (HCA/CCA FAC) model for pricing of local loop unbundling. It has taken this approach in response to a range of factors identified and acknowledged by Professor Vogelsang as inapplicable in the New Zealand context and the definition of TSLRIC under the Act.

647 The Commission has acknowledged that its decisions on these TSLRIC modelling issues were made for other reasons, including regulatory predictability and the New Zealand context in which its assessment is being made and to give effect to section 18. We note that Professor Vogelsang observes that investment incentives will only be encouraged if TSLRIC is correctly calculated.[233]

648 The Commission considers that a TSLRIC-based price should reflect the efficient costs of building an equivalent service today and, therefore, incentivise efficient build or buy choices.[234] The intention is that an RSP will build an alternative network rather than purchase regulated access only where building is more efficient and therefore is in the long-term best interests of end-users.[235]

649 We consider that Professor Vogelsang's argument, that by not modifying the TSLRIC method to take into account the re-use of existing assets the Commission is determining a higher price, is in direct contradiction with the build or buy principles and promotion of efficient investment. Modifying the TSLRIC method to take into account the re-use of existing assets would lower the UCLL price and bias an RSP's build or buy decision towards purchasing regulated access at odds with the section 18 purpose.

[232] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 5.1.

[233] Vogelsang "Current academic thinking about how best to implement TSLRIC in pricing telecommunications network services and the implications for pricing UCLL in New Zealand" (25 November 2014) at [3].

[234] See Commerce Commission "Draft determination for UCLL" (2 December 2014) at [138] to [146] and "Commerce Commission "Draft determination for UBA" (2 December 2014) at [108] to [116].

[235] See Commerce Commission "Draft determination for UCLL" (2 December 2014) at [139] and "Commerce Commission "Draft determination for UBA" (2 December 2014) at [109].

650 Professor Vogelsang appears to have overlooked this key build/buy efficient investment principle in the Commission's approach to TSLRIC.[236] As Professor Hausman has advised, the Commission's draft decision to use FTTH rather FTTN as the basis to determine the UCLL TSLRIC price – in the absence of an uplift – will distort investment decisions by RSPs. When the WACC or TSLIRC price is underestimated, RSPs will always find it in their economic interests to purchase the regulated access to the legacy copper-based UCLL service even if a build response might be more efficient at the margin. This distortion of the build/buy choice is inconsistent with the Act.[237] By contrast, a correct forward-looking implementation of TSLRIC would not only set efficient build/buy incentives; it would also achieve cost recovery over time, consistent with the principle of financial capital maintenance.

651 In addition, Professor Hausman raises a number of examples of the one-sided view Professor Vogelsang has taken to the extent to which TSLRIC regulation distorts investment incentives and leads to too little investment as a result of underestimation of the WACC from a failure to adequately address asymmetric risk.[238] Professor Hausman highlights the lack of empirical evidence for Professor Vogelsang's claim that no uplift is required because the TSLRIC price is "more than high enough".[239] Instead, as Professor Hausman notes, academic research demonstrates the "free option" given to RSPs under TSLRIC regulation distorts investment incentives and leads to reduced investment by the regulated firm.[240]

652 As Professor Hausman states, the Commission's "protection" of RSPs' investment is misplaced because RSPs' investment will not lead to quality improvement in such things as higher speeds for broadband, reduced network congestion or rural broadband roll out for consumers. The conclusion of academic research is that regulation should adjust the WACC and/or TSLRIC price to take account of this distortion and the disincentive it creates for investment.[241]

653 In terms of performance adjustment, as noted by Analysys Mason, a performance adjustment would likely mean that the resulting price would not cover replacement costs.[242] Any adjustment based on willingness to pay would not result in an estimate of cost as required by the Act. Further, as the Commission correctly notes, such adjustment would also be very difficult to estimate in practice, and unpredictable.[243]

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[236] See Commerce Commission "Draft determination for UCLL" (2 December 2014) at [142] and Commerce Commission "Draft determination for UBA" (2 December 2014) at [112].

[237] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [6(vi)] and [38].

[238] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [48]-[53].

[239] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [59]. See also [54], [62]-[63].

[240] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [23]-[24].

[241] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [32]-[33].

[242] Analysys Mason "Paper on framework and modelling approach" (6 August 2014) at [1.12].

[243] Analysys Mason "Paper on framework and modelling approach" (6 August 2014) at [567].

The asymmetric social costs of too low a WACC and TSLRIC price

654 The asymmetric social costs of major supply outages as a result of under-investment (from too low a price) are important.[244] Network outages are a significant factor in the telecommunications context, just as they are in electricity networks.

655 The basis for the Commission's view is that UFB is being deployed to replace Chorus' copper network, so the costs to end-users of network outages for UCLL and UBA are likely to be significantly less than for electricity lines services because there are more readily available substitutes for fixed line telecommunications services. But this fails to properly address that:

655.1 critical services (including mobile networks) rely primarily on fixed line services; and

655.2 the wider economy (including most financial transactions and business interactions) also relies heavily on fixed line access services.

656 It is foreseeable that if the TSLRIC price for the regulated services is set too low, not only will it not address the required build/buy framework imperative, there may be incentives for Chorus to underinvest in existing and new services, even if Chorus was operating as efficiently as the Commission considers appropriate. The result of the UBA IPP determination has been that Chorus has taken steps to limit pro-active maintenance, restricting discretionary capital investment and moving to full cost recovery in some areas. As CEG notes, Chorus:[245]

> may have an incentive to spend as little as possible providing existing services to its current customers. It is also likely to have little if any incentive to invest so as to try and obtain new customers, including by making investments in new regulated products, since it will not cover its costs in doing so. These consequences are very similar to those caused by asymmetric risk …
>
> The fact that a new product might be unregulated may also not quarantine it from the effects of incentives determined by the level of regulated prices. Suppose that Chorus is considering investing in a new unregulated service that is a "new and improved" version of an existing regulated product. It may be disinclined to do so if the price that it can charge is effectively "anchored" by the regulated price for the existing product.

657 Ceasing to develop new products or technologies is a particularly significant issue in telecommunications due to the rapid pace at which technological changes occur (for example, the recent development of VDSL and vectoring). The potential loss to consumers from failure to invest is significant. Professor Hausman's analysis supports this point. He refers to a number of empirical studies which show significant welfare gains from investment in new telecommunication technologies (and the corresponding welfare losses where that investment does not occur).[246]

[244] See CEG "Uplift asymmetries in the TSLRIC price" (February 2015) at [11]-[17] and [39]; and Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015), section IV and V.

[245] CEG "Uplift asymmetries in the TSLRIC price" (February 2015) at [34]-[35].

[246] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [7]-[14]. See also CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 3.1.

658 Given the copper services that are being regulated, we disagree with Professor Vogelsang when he states as a reason for not allowing for an uplift that further investment in copper access in unprofitable rural areas is not necessarily something to be encouraged. Professor Hausman's evidence is that because only Chorus is investing in the copper network, quality improvements (and corresponding welfare gains) will arise from Chorus investment which may be especially important in rural areas where fibre does not extend.[247]

659 The foreseeable potential consequences of too low an access price could lead to:

659.1 a reduction and on occasion complete loss of voice and/or broadband services; and

659.2 persistent and potentially worsening congestion at peak times.

660 The severity of these consequences for end-users is significant:

660.1 emergency service calls are critical – note that Chorus is a critical utility provider with obligations under the Civil Defence Emergency Management Act 2002 and a member of the NZ Lifeline Committee[248] – one of whose three themes is to provide "robust assets". The Auckland City Council described the complexity of telecommunications as a lifeline utility as follows:[249]

> The telecommunications sector is one of the most complex of the lifeline utility sectors. This is due to the rapid change of technology, providers and customer preferences. Another factor is the level of inter-connectedness between the various providers which share parts of the network and exchange messages between networks.

660.2 there can be significant short term economic loss to business and industry – there will be loss of EFTPOS, internet transactions, banking and financial systems, e-government system issues (including IRD etc.);

660.3 hospital and medical record systems are disrupted; and

660.4 communication across the board suffers.

661 As Professor Hausman points out, consumers, businesses and government agencies all rely on the internet for email, downloads for work, entertainment, e-services and many other uses.[250] Given the high value that consumers, businesses and government agencies place on the internet, regulatory approaches

[247] Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [57] and [58].

[248] New Zealand Lifeline Committee brochure, available at http://www.civildefence.govt.nz/assets/Uploads/publications/nzlc-brochure.pdf.

[249] Auckland Council "Natural hazards and emergencies", available at http://www.aucklandcouncil.govt.nz/EN/environmentwaste/naturalhazardsemergencies/hazards/Pages/infrastructurefailure.aspx.

[250] As recognised by Professor Hausman in his paper on uplift issues: Professor J Hausman "Response to the Commerce Commission's draft determination on uplift" (February 2015) at [18].

which assist to create investment incentives to provide internet and decrease outages will lead to significant gains in economic welfare.

662 The effect on, and consequential cost to, end-users and the wider economy can be significant. A fire in Telstra's exchange in Warrnambool in November 2012 cut off over 65,000 telephone services (including internet and phone line access, ATM, EFTPOS services and traffic signalling). This was calculated by the Victorian Government to have directly cost AU $18 million to the region as well as flow-on costs of AU$28.3 million, with 89 job losses in the region.[251] There are also a number of examples of outages in the New Zealand telecommunication networks which have impacted on the general community. [252]

663 In the latest "Briefing to the incoming Minister of Communications" following the 2014 election, the Ministry of Business, Innovation and Employment (MBIE) stated that:

- use of data and voice services has the ability to lift productivity across all sectors of the economy;
- if firms currently making low use of internet services became more like high use firms, it could be worth an additional $34 billion in productivity (Sapere, 2014);
- both public and private services are being re-designed so that consumers have new ways of expressing choice and participating in society (for example, the use of sensors to help run cities and communities efficiently, and precision forms of agriculture);
- there remains communities which are still not connected to the internet;
- ongoing private sector investment will be required and the settings have to be right to encourage investment and innovation;
- it is critical that key telecommunication networks are reliable, secure and resilient;
- availability of broadband impacts on achievability of Better Public Services – for example, in relation to the ability of New Zealanders to complete their transactions with government easily in a digital age; and

[251] ZDNet "Vic govt puts Warrnambool exchange fire cost at AU$18m" (26 March 2013), available at http://www.zdnet.com/article/vic-govt-puts-warrnambool-exchange-fire-cost-at-au18m/.

[252] For example, there have been several previous situations involving telecommunications failure (across technologies), including:
- in 2005 - two separate cable faults paralysed Telecom's broadband and mobile networks in the North Island. This led to overloaded landlines and major difficulties for the New Zealand Stock Exchange (NZX);
- in 2010 - parts of Telecom's new XT network failed. Calls in and out of the mobile network failed in different areas of New Zealand throughout the year; and
- in 2011 - a fibre optic cable failure led to a number of police stations without certain services. Police headquarters, 130 police stations and three communications centres had to use manual processing for some procedures with efficiency loss.

- the UCLL/UBA price setting process has generated a high degree of uncertainty and still has the potential to have a significant impact on the UFB build and migration to fibre.

664 We also note CEG's advice that as Chorus faces inter-modal competition, the price set for UCLL and UBA services has the potential to not only affect Chorus' incentives and conduct, but also its competitors. This would tend to favour erring on the high side when setting prices. Otherwise, the price may inhibit new firms entering the market or at least skew the build/buy imperative of TSLRIC to buy. CEG and Professor Hausman advise that as a result, regulators will often provide an uplift to the WACC and/or TSLRIC price to overcome these difficulties.

Allowing for asymmetric risk

665 The Commission should factor the presence of asymmetric risks into its consideration of whether an uplift is required to the TSLRIC prices for UCLL and UBA. A range of asymmetric risks are present which the Commission has not otherwise adequately accounted for in its TSLRIC calculation to date. Its proposed targeted *ex ante* allowances do not properly address the risks that arise.

666 CEG explains that asymmetric risks occur where the basis for determining the price of the UCLL and UBA services under- or over-compensates the regulated business in expected terms. Asymmetric risks provide a rationale for setting the price higher or lower so as to align the price allowed with the expected costs of the business. The CEG Uplift Asymmetries paper recognises that, in the long run, providing compensation to a regulated business that is less than its expected average costs may have negative welfare consequences. That is, in the long run, concerns over asymmetric risks may actually be concerns over asymmetric costs. But in CEG's report, as here, we continue to address asymmetric risks as a separate area of analysis, reflecting the Commission's treatment of asymmetric risks in its draft determination.

667 There are a number of sources for asymmetric risks to the provider of UCLL and UBA created by the Commission's draft determination. Asymmetric risks may be divided into general categories of uncertainty relating to:

667.1 uncertainty due to catastrophic event risk;

667.2 input cost uncertainty (such as deployment and civil engineering costs);

667.3 technological progress and the potential for changes in demand and asset stranding; and

667.4 macro-economic uncertainty, including uncertainty in the regulatory environment.[253]

[253] Refer CEG "Response to Commerce Commission UCLL/UBA WACC Consultation Paper" (March 2014) at [325] and also see BEREC "Report on the Implementation of the NGA-Recommendation" (October 2011) at page 80 relating to European telecom regulators regulation of local loop access services: *NRAs should estimate investment risk inter alia by taking into account the following factors of uncertainty: (i) uncertainty relating to retail and wholesale demand; (ii) uncertainty relating to the costs of deployment, civil engineering works and managerial execution; (iii) uncertainty relating to technological progress; (iv) uncertainty relating to market dynamics and the evolving competitive situation, such as the degree of infrastructure-based and/or cable competition; and (v) macro-economic uncertainty*."

668 We also note that the EC recognises the need for an uplift to be applied, at least to the WACC, in order to acknowledge the higher risk (uncertainties) of FTTH investment in circumstances where the copper price is set by modelling a fibre MEA. The Commission should not adopt the EC's overall approach to setting copper prices, because that approach departs from forward-looking TSLRIC (for example, in its treatment of re-use of assets). Nevertheless, in the limited context of setting an appropriate uplift, given that the Commission is modelling a fibre MEA it should take into account the higher risks of fibre faced by the HEO – as the EC has done.

669 These higher risks arise from: (i) uncertainty relating to retail and wholesale demand; (ii) uncertainty relating to the costs of deployment, civil engineering works and managerial execution; (iii) uncertainty relating to technological progress; (iv) uncertainty relating to market dynamics and the evolving competitive situation, such as the degree of infrastructure-based and/or cable competition; and (v) macro-economic uncertainty. The approach to cost-modelling of a fixed access network in the EU follows the NGA recommendation issued by the EC, which clearly sets out the principles when and how to apply a premium on the cost of capital estimated for the purpose of setting unbundled local loop and bitstream access prices.[254]

Catastrophic event risk

670 The Commission should include catastrophic event risk in its consideration of the need for an uplift, to more accurately account for the true costs arising.

671 We agree with the Commission's draft determination to include ex ante compensation for catastrophic event risk given ex post compensation is not available. Further, pricing decisions should reflect the efficient costs that an HEO would be expected to incur. An HEO would prudently insure against catastrophic event risk. The costs of this insurance should be taken into account in the Commission's calculation of TSLRIC for the HEO.

672 We do not agree with the Commission that these risks are adequately compensated by capex expenditure on seismic bracing and backup generators, and Chorus' actual insurance costs.

673 Chorus incurs more varied costs than just for seismic bracing and backup generators. For example, Chorus' capital expenditure on risk management also includes other measures such as protection from fire and lightning.[255] The CEG Uplift Asymmetries paper includes a range of other examples.[256] While many of these risks can be insured, Chorus nevertheless incurs substantial capital

[254] BEREC "BEREC Report on the implementation of the NGA-Recommendation" (October 2011) at pages 80-90. ("Investment risk should be rewarded by means of a risk premium incorporated in the cost of capital … NRAs should, where justified, include over the pay-back period of the investment a supplement reflecting the risk of the investment in the WACC calculation currently performed for setting the price of access to the unbundled copper loop… Generally, the concept of a "risk premium", which is part of the rate of return (cost of capital) is related to a regulated access price…"). Available at http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/234-berec-report-on-the-implementation-of-th_0.pdf.

[255] **[CI:]**

[256] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 4.1.2.

expenditure to mitigate these risks, and this expenditure needs to be taken into account. These expenditures reduce the probability and likely magnitude of damage to Chorus' infrastructure as a result of catastrophic events.

674 It is also not reasonable to use Chorus' insurance costs alone as an indicator of the costs associated with catastrophic event risks. This is because the insurance options available to Chorus are incomplete in the sense that not all of Chorus' catastrophic event risks can be insured against, or in any case are not insured against.

675 For example, our insurance for catastrophic events does not include coverage for cables, poles and ducts outside of the CBD area. In addition, Chorus is unable to insure against loss in demand from the creation of any red-zone type decisions. Notably unlike the situation with Orion following the Canterbury earthquakes, any assets which are damaged, but not disposed of, will not remain in the RAB and therefore we will be unable to still earn a return on those assets.[257] Again, the CEG Uplift Asymmetries paper includes a range of other examples.

676 Such residual risks are borne internally by Chorus, and are not reflected in our insurance costs. Chorus' actual expected risk management costs are thus higher than our insurance costs since Chorus will have to bear the expected costs of those uninsured risks.

Technological development and asset stranding

677 We agree that the Commission should compensate Chorus for the risk of asset stranding due to technological change. There is a greater technological stranding risk in telecommunications than in other utility sectors.[258]

678 TSLRIC pricing does not allow for the same *ex post* protections for technology change and asset stranding as offered under the RAB based regulatory model. Therefore this risk should be included in the Commission's consideration of the need for an uplift to the TSLRIC price.

679 Adopting Chorus' asset lives does not compensate for this risk. This is because of a number of limitations with our financial statements which mean that they do not adequately consider technological obsolescence for the purpose of considering an appropriate return on capital under a TSLRIC model. In particular, our financial accounts:

679.1 are prepared annually and therefore only reflect assumptions of known developments for the immediate future, not a 5 year regulatory period;

679.2 are developed to meet particular accounting standards;

679.3 are backward looking, based on actual events that have occurred or which are known to be present in the market, which means that the

[257] Refer to Commerce Commission "Setting the customised price-quality path for Orion New Zealand Limited Final Reasons Paper" (29 November 2013) at B10.2.

[258] A recent example of technological developments which could lead to asset stranding is the possibility of 4G wireless home broadband in Australia – see CNET "Vodafone offers 4G alternative to fixed line broadband" (21 January 2015), available at http://www.cnet.com/au/news/vodafone-offers-4g-alternative-to-fixed-line-broadband/).

accounts do not take account of events that are likely to happen or are due to occur imminently until they occur; and

679.4 do not take account of a fundamental change of a MEA under a TSLRIC calculation.

680 CEG considers the difficulties with use of the asset lives provided by Chorus in its financial statements in detail. As CEG explains,[259] under accounting standards (which Chorus' auditors must comply with) an accounting practitioner would not necessarily need to consider the likelihood of an asset utilised by Chorus, or its entire network, being supplanted by an alternative technology if that impairment were to happen beyond the range of management forecasts.

681 On the other hand, the Commission has been set the task of determining the extent to which the asset lives of the HEO should be impaired given the risk of potential technological stranding. CEG considers that relying on the confirmation of Chorus' auditors that its asset lives have been adjusted for obsolescence is not reasonable for this purpose because:

681.1 the assets of Chorus are not the same as the assets of the HEO. Chorus' assets consist of aged assets of a copper network. The HEO's are new assets of a fibre network; and

681.2 the auditors' task is to impair an asset when its value is impaired (or is likely to be impaired) by a new technology. The task for the Commission is different: it must take into account the probability that technological stranding may occur over the life of a new asset, in order to provide for present value neutral compensation over time. The Commission must estimate the "expected life" of the asset, which weights the potential lives of assets given technological developments and the probability of those developments. For example, auditors will use the physical life of an operator's buildings and will write the value down if there is a fire that means the buildings are no longer habitable. However, the Commission should use the expected life of the buildings based on the probability of a fire occurring which results in the building being destroyed.

682 As a result, the asset lives used in our financial statements will:

682.1 take account of known technological developments that are currently being deployed in New Zealand market, and would not take account of any potential new technologies that might enter the market in the foreseeable future (or beyond), unless they are considered likely to have an impact on Chorus (i.e. new technology may enter the market but unless Chorus decide to use that technology, then the current useful life stands);

682.2 only takes account of stranded assets once the asset is actually stranded or are planned by Chorus to be stranded in the future;

[259] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 4.3.1.

682.3 generally address stranded assets (such as assets affected by the Canterbury earthquakes) by having them written off, rather than altering the asset lives (as the asset lives are reviewed from a whole of NZ perspective not a geographically segmented perspective); and

682.4 not account for changes in demand forecasts (such as LFC demand) until this occurs and is considered significant enough for Chorus to change its overall network planning and therefore the useful lives of the asset or the impact is so significant such that the cash flows the assets produces no longer support its current carrying value and the asset is written down.

683 An additional issue arises as to the risk of asset stranding from new entry and changes in demand. CEG considers that the expectation of competition remains a source of asymmetric risk that the Commission does not compensate for in its draft determination. This is because the Commission is not providing for a present value neutral regulatory framework if it does not have regard to the potential for competitive stranding. CEG explains that the possibility of competition will bias downwards Chorus' expected returns and give rise to a source of asymmetric risk (which is associated with its own welfare costs in the long run). Asserting the benefits of competition does not provide a reasonable basis for the Commission to ignore the effects of potential competition on Chorus.

Regulatory stranding

684 The TSLRIC framework proposed by the Commission has the potential to strand a large proportion of Chorus' investment in its copper network. Over time, it could be expected to similarly strand the assumed investment of the HEO that the Commission models as the TSLRIC exercise is repeated in the future. The Commission should address this asymmetric risk through the use of a price uplift.

685 CEG notes that, in the context of Professor Vogelsang's arguments, the Commission's modelling choices in this area could be regarded as being "not generous" to Chorus and reinforcing the need for an uplift. This is because, the Commission's implementation of TSLRIC through the prism of the HEO can be seen as a commitment to periodically cost an efficient network *at the time of the assessment* without regard to whether either:

685.1 the costs that it models are achievable by the incumbent operator that it will use its model to set prices for; or

685.2 the costs that it models are achievable over time by the operators that it has previously hypothesised as efficient for this purpose.

686 As CEG explains,[260] the net result contributes to asymmetric risk through regulatory stranding, where the Commission's proposed pricing framework measures a level of costs over time that is not achievable by Chorus (and indeed is unachievable by the Commission's HEO or any hypothetical business).

Implementation of uplift

687 The CEG Uplift Asymmetries paper describes how a WACC and/or TSLRIC price uplift can be calculated. While the Commission has an orthodox methodology for

[260] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 4.2.

deriving an appropriate uplift to the WACC estimate, it has not previously had to estimate an uplift to the TSLRIC price. CEG explain that Monte Carlo analysis could be used to simulate the uncertainty in key TSLRIC modelling parameters (including WACC) and how this information could be used to estimate uncertainty in the resulting TSLRIC prices for UCLL and UBA.[261]

[261] CEG "Uplift asymmetries in the TSLRIC price" (February 2015), section 6.