Determining a TSLRIC price for Chorus' UCLL service

A REPORT PREPARED FOR VODAFONE NEW ZEALAND, TELECOM NEW ZEALAND AND CALLPLUS

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Executive summary

Vodafone New Zealand, Telecom New Zealand and CallPlus (collectively "the parties") have asked Frontier Economics to prepare a report that responds to the Commerce Commission's paper titled "Process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop services in accordance with the Final Pricing Principle" (the Issues Paper).

The Commission should take a balanced approach to forward-looking TSLRIC modelling that recognises that an efficient network built today would use a combination of new assets and existing sunk assets

There is no single method used by all regulators worldwide to cost unbundled copper local loops. While there are many reasons for this, one key reason is that regulators operate under different legislative regimes that place different weights on the pursuit of different (potentially conflicting) objectives.

The consequence of this is that the Commission can't simply lift a standard cost modelling approach from elsewhere in the world and apply it directly to pricing the UCLL in New Zealand. Instead, it will have to develop a consistent package of modelling considerations that are tailored to best meet the requirements of the New Zealand legislative regime.

To achieve this, the Commission must be guided by the requirements set out in the Telecommunications Act (the Act). These require that it adopt a forward-looking TSLRIC method to estimate the price of the UCLL. Aside from that, there are very few specific modelling requirements mandated in the Act.

It is conceivable that the Commission could interpret a forward-looking network to be one that is a greenfield network. We believe, however, that such an extreme approach to modelling the TSLRIC of the UCLL would be inappropriate because a hypothetical new entrant building an efficient network today would seek to use some existing sunk assets (such as ducts and trenches) to build its network. This is because the cost of rebuilding some of these assets is likely to be prohibitively high, and it would be more efficient to simply use some existing assets. It is also recognised by regulators internationally that a greenfield approach to forward-looking TSLRIC modelling can create perverse incentives that can lead to inefficient use of and investment in telecommunications networks.

In contrast, we recommend the Commission adopt an approach to modelling the forward-looking TSLRIC of the UCLL that is more refined in nature, and which has regard to the following key principles:

- Any efficient telecommunications network will be designed in a way that utilises at least some existing sunk assets.

- Given increasing recognition by regulators that large parts of the access network will not be duplicated, focusing overly on build-buy incentives is likely to be unhelpful because prices cannot realistically affect entry incentives or disincentives.
- Incentives for efficient investment will best be created by an approach to modelling that delivers more certainty to all parties, including Chorus and its access seekers. In practice, this means reducing the ongoing risks associate with frequent valuation and optimisation of assets.
- Revaluation windfalls for Chorus would be inconsistent with the purpose of the Act related to efficiencies, as it would produce prices that are higher than necessary to recover efficient costs. This is especially the case if the modeled network departs substantially from the network Chorus actually uses to provide the UCLL. This would allow Chorus to recover the capital costs of hypothetical infrastructure investments it has not made, in circumstances where much of the cost of the existing legacy copper network has already been recovered.
- The Commission must be wary of approaches that "cherry-pick" features of different models from overseas jurisdictions that, in combination, would not achieve an outcome that meets the purpose of section 18 of the Act.

Specific modelling recommendations in our report

In making recommendations about specific modelling decisions, we have found it helpful to split our recommendations into two kinds – those that apply to all kinds of assets (which we refer to as "core recommendations"), and those that are specific to certain asset types (which we refer to as "contingent recommendations"). This is because our view is that the approach to the valuation and depreciation of assets that will be re-used from today's existing current generation access (CGA) network should be different to the approach used for next generation access (NGA) networks, to reflect the historic recovery of the costs of the former assets.

Our high level modelling recommendations are as follows:

- The Commission should develop its own bottom up model and take account of top down information from Chorus, both as a cross check (which will be less relevant if an all fibre MEA is used), and to calculate remaining asset lives.
- Apply a modified scorched node approach to network design, maintaining MDF locations but optimising for quantities and cabinet locations.
- The full local loop, plus other key services, should be modelled to capture economies of scope, particularly between the core and access networks.

- If the Commission favours an all fibre MEA, performance adjustments will be required. This would be less of an issue if it adopts an MEA that more closely reflects the existing copper-fibre technology mix.
- Network demand should be held relatively constant, on the basis that this will be consistent with keeping unit costs relatively constant in the transition to fibre networks.
- The WACC approach should recognise relationships between greater optimisation, resets and demand risk on the WACC.

For key assets used to supply the UCLL that would be likely to be re-used if a hypothetical new network was constructed today (such as the ducts and trenches) we consider the following TSLRIC modelling approach is appropriate:

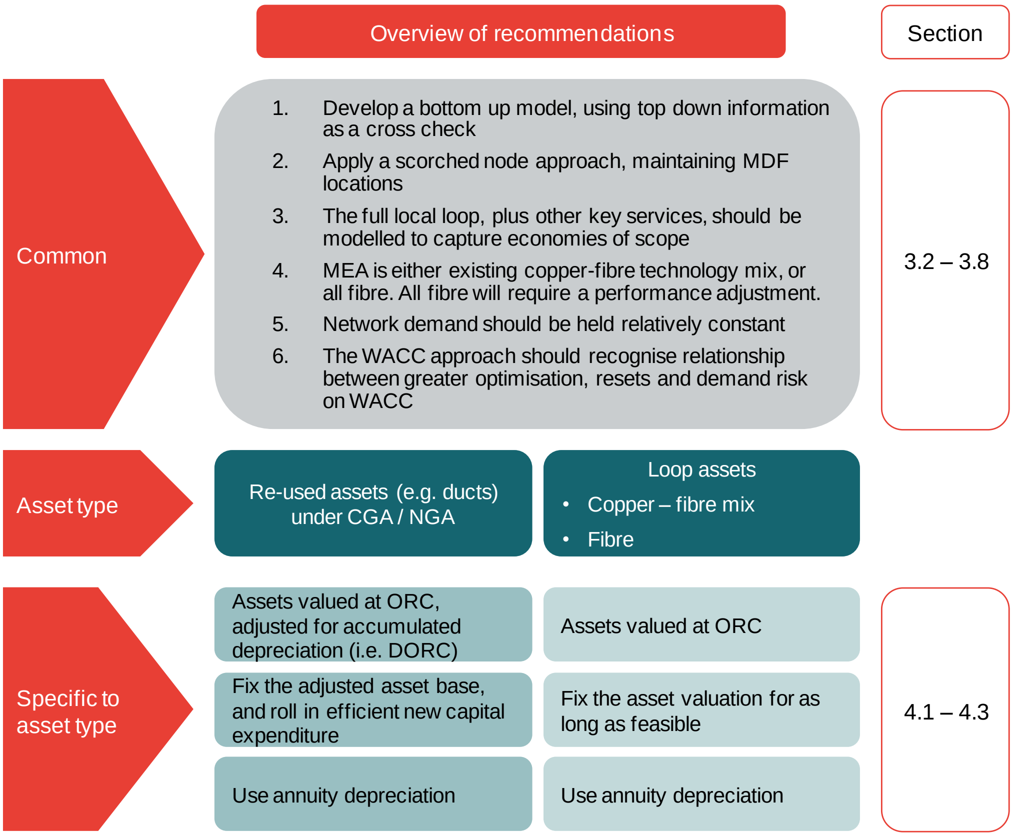
- Assets should be initially valued at their optimised replacement cost (ORC) using a bottom-up approach.
- The valuation should then take account of accumulated depreciation, reflecting the average age and total expected life of these assets from Chorus' accounting data or independent engineering studies.
- This asset base should be fixed and efficient new capital expenditure rolled in at replacement costs.
- Depreciation should be recovered through the use of a standard (flat) annuity, reflecting an asset in a steady state that will not be bypassed.

For the key loop assets, defined to be either the current copper-fibre hybrid, or an all fibre network, we consider the following TSLRIC modelling approach is appropriate:

- Assets should initially be valued at ORC.
- This asset valuation should be fixed for as long a period as the Commission thinks is feasible.
- Depreciation should be recovered through the use of a tilted annuity, reflecting future changes in asset prices.

The key recommendations contained in our report are summarised in the figure below.

Figure 1. Key TSLRIC modelling choices



Source: Frontier Economics

The different approach on our contingent recommendations reflects two main factors:

- The revaluation gains that are likely from sunk assets that are not likely to be bypassed in the future are potentially substantial, meaning that if these assets are valued at their full ORC, Chorus will earn far more in UCLL prices than the value of its actual investments.
- For loop assets, where asset lives are shorter and hence current costs are necessary to provide appropriate investment signals, there is a stronger argument to value these at their current costs (and in the case of a hypothetical full fibre network, such costs must be valued at ORC). However, the Commission should minimise the uncertainty of ongoing revaluations and optimisations as much as is feasible.

1 Introduction

On 6 December 2013, the Commerce Commission (Commission) released a paper titled "Process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop services in accordance with the Final Pricing Principle" (the Issues Paper).

The Commission has released this paper because a number of parties have asked it to review the price it had determined for the unbundled copper local loop (UCLL) service using an initial pricing principle (IPP) based on an approach involving benchmarking against prices set in comparable overseas jurisdictions.

Under New Zealand's Telecommunications Act (the Act), the Commission must, when reviewing prices determined via an IPP, determine a price using an alternative final pricing principle (FPP). Subpart 1 of Part 2 of Schedule 1 of the Act specifies that the FPP the Commission must use to set the price for the UCLL is total service long run incremental cost (TSLRIC). This is the first time the Commission has been asked to set a price for the UCLL in New Zealand using the FPP.

It is standard practice internationally for regulatory authorities to build costing models to set a price for unbundled copper local loops in accordance with long run incremental cost pricing principles. We believe it is appropriate that the Commission develop a cost model of its own to set prices for the UCLL under the FPP.

As we shall note throughout our report, there are a variety of different methods used by regulators to determine long run incremental costs for unbundled copper local loops. This is partly because there are many methodological matters that regulators need to make decisions about when deciding what cost modelling approach best suits the circumstances in their particular jurisdictions.

The Issues Paper raises a number of methodological matters the Commission will need to consider when developing a TSLRIC model for the UCLL.

Frontier Economics has been asked by Vodafone New Zealand, Telecom New Zealand and CallPlus (collectively "the parties") to prepare a report that responds to the Commission's Issues Paper.

The report has been prepared jointly by Frontier Economics Ltd in Europe and Frontier Economics Pty Ltd in Australia.

1.1 Structure of the report

In our experience, the specific approach taken by regulators to model the long run incremental cost of unbundled copper local loops depends (amongst other things) on the underlying objectives and purposes set out in the regulatory regimes in their respective jurisdictions. These underlying objectives and purposes drive the choice of model the regulator adopts, and the specific parameters that are applied within their model.

We believe, therefore, that it is crucially important that the Commission takes a principled approach to modelling the TSLRIC of the UCLL, and that it adopts a framework for making decisions on key modelling parameters that seeks to best achieve the underlying objectives and purposes that underlie the New Zealand regulatory regime.

Our approach to our report reflects this philosophy:

- Section 2 of the report analyses the fundamental objectives and principles that should inform the Commission when choosing what approach to take to key matters associated with estimating the TSLRIC of the UCLL in New Zealand.
- Section 3 then applies these objectives and principles to make a series of "core recommendations" on key modelling issues that do not vary according to the type of asset being modelled.
- Section 4 applies these objectives and principles to make a series of "contingent recommendations" on modelling issues that will vary according to the type of asset being modelled.

2 Determining an underlying set of principles

There are a number of ways a regulator could seek to model the cost of providing a UCLL service. As indicated in its Issues Paper, the Commission recognises it will need to make decisions on a number of critical modelling issues, including:

- whether to develop a bottom-up or top-down model
- how heavily it should optimise its vision of the network used to provide the service (i.e. should it adopt a scorched earth approach or some variant of a scorched node approach)
- what approach it should take to allocating common costs between the UCLL and other services provided over the network it models
- how should the Commission model demand for the service over time
- what approach should it take to depreciating the capital costs estimated in the model, and what level of return should it allow on these costs.

Decisions made on each of these – and other issues canvassed in the Issues Paper – will greatly affect the final price estimated by the Commission in its FPP process.

This means that the decisions the Commission makes on individual modelling considerations are important. It is also the case that there are interdependencies between the choices made on individual modelling questions such that the package of decisions on individual parameters should be analysed as a whole. For instance, a decision to value assets at full replacement costs may be appropriate provided the Commission also makes complementary choices with regard to other modelling considerations, such as the form of depreciation.

In order to settle upon an appropriate set of modelling choices, the Commission must have in mind a clear set of objectives it is trying to achieve. The purpose of this section of our report is to establish (and therefore recommend) a framework we believe the Commission should adopt to make key modelling decisions in its FPP process. It does this by:

- First, observing that there are many approaches taken by regulators around the world to set cost-based prices for unbundled copper local loops.
- Second, outlining those key legislative requirements that should determine the underlying objectives the Commission should seek to rely upon when deciding what approach to take on key modelling parameters.
- Third, outlining the dangers of taking an overly theoretic approach to modelling the TSLRIC of the UCLL.

- Fourth, recommending a key set of objectives that we believe the Commission should follow to help determine an appropriate package of modelling decisions for the UCLL in New Zealand.

Sections 3 and 4 of our report then apply these principles to develop a consistent set of recommendations on key modelling issues raised in the Commission's Issues Paper.

2.1 There is no single agreed way to model TSLRIC

Historically, there has been a wide variety of approaches used to determine a cost-based price for unbundled local loops by regulators around the world (and even across Europe). This contrasts with other services, such as interconnection services, where there is typically a broad consensus on how services should be costed at any point in time[1]. The approach taken by individual regulators can vary according to a number of factors, including differences in the:

- legislative regime that guides the approach the relevant regulator should take to determining the price of a service
- the relative weight given to different regulatory objectives
- sophistication of, and resources available to, different regulatory authorities and stakeholders
- the local market and the decision-making environment within which decisions are made.

The variations in approach taken by different regulators can be seen with reference to **Table 1** below, which sets out the approaches taken by leading regulatory authorities to model the cost of unbundled copper local loops on a selection of key modelling decisions.

1 In some cases, however, this consensus evolved over a considerable period of time. For example, the move from TSLRIC like approaches to modelling termination rates on the basis of LRIC based approaches evolved over a number of years in Europe.

Table 1. Different approaches to local loop cost modelling

Country	Forward-looking or actual cost	Bottom-up or top-down	RAB or resets with ORC	Scorched earth or node	Choice of MEA
UK	Current costs (indexation) with RAV adjustment to value some assets at historic cost	Top down	RAB	Based on BT's network so no optimisation	No MEA adjustments are applied in BT's regulatory financial statements
Ireland	Forward looking costs	Bottom-up model	The model calculates a total network gross replacement cost and calculates capital costs and depreciation using a tilted annuity approach	Scorched node	Copper network
Denmark	Forward looking costs	Bottom-up model developed by the regulator Reconciliation with top down model	The model calculates a total network gross replacement cost and calculates capital costs and depreciation using an annuity approach	Scorched node	Current mix of traditional and FTTC based copper network sharing infrastructure with parallel fibre and cable networks
Switzerland **Current proposal for revision of national telecommunication law**	Forward looking costs	Bottom-up model	Gross replacement costs	N/A	Based on FTTH technology where this is reasonably possible, copper technology where fibre deployment remains unlikely
Germany	Current replacement costs considered until the next approval period 2 years later	(I) Bottom-up model developed by incumbent. (II) Bottom-up model developed by regulator.	Network gross replacements costs based on (II). Other costs based on (I)	Scorched node	The model reflects the current state of development between traditional local loops and sub-loops based on the FTTC technology taking into the level of parallel fibre deployment
Australia pre-2010	Forward looking costs	Bottom up	Resets with ORC	Scorched node	Technology mix of fibre, copper and fixed wireless
Australia post-2010	Lock in initial asset value Ongoing capital expenditure rolled in at replacement cost	Top down	Lock in initial RAB	No optimisation; prudency on new capital expenditure	NA

Source: Frontier Economics

In more recent times, there have been moves towards a harmonised approach in Europe with the adoption of European Commission recommendations on NGA regulation[2] and costing methodologies[3], which provide a broad framework within which to set prices. The 2013 Recommendation on costing methodologies addresses a number of the issues relevant to the Commission's objectives, and we believe it can provide a useful basis for considering these issues. Nevertheless, it has not been fully implemented by national regulatory authorities (NRAs) to date, with NRAs given the option to continue with existing UCLL costing methodologies subject to certain conditions.

In our view, the consequence of this is that the Commission will not be able to simply apply a standard form of local loop cost model that is universally accepted and applied in practice by a majority of other regulatory authorities to determine TSLRIC prices for the UCLL in New Zealand.

Instead, it will need to settle on a package of modelling decisions that best meets the objectives that are most appropriate in the context of setting prices for the service in New Zealand.

2.2 The New Zealand approach must be consistent with the local regime

The starting point for determining a set of principles that will enable the Commission to choose a package of modelling methods that best meets the appropriate objectives lies in the requirements of the legislative regime it has to enforce.

Subpart 1 of Part 2 of Schedule 1 of the Telecommunications Act (the Act) specifies that the final pricing principle for the UCLL must be TSLRIC.

Further, Subpart 1 of Part 1 of Schedule 1 of the Act specifies that TSLRIC:

> (a) means the **forward-looking** costs over the long run of the total quantity of the facilities and functions that are directly attributable to, or reasonably identifiable as incremental to, the service, taking into account the service provider's provision of other telecommunications services; and
>
> (b) includes a reasonable allocation of **forward-looking** common costs. [emphasis added]

2 COMMISSION RECOMMENDATION of 20 September 2010 on regulated access to Next Generation Access Networks (NGA) (2010/572/EU)

3 COMMISSION RECOMMENDATION of 11 September 2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU)

Other than this, there is little guidance as to how the Commission should interpret the meaning of TSLRIC. We agree with the Commission's Issues Paper when it indicates that:

> The definition of TSLRIC in the Act is broad and provides limited practical guidance on the various choices that need to be made when undertaking a cost modelling exercise. Section 19 directs us to be guided by the purpose set out in section 18 in making such choices. This means that TSLRIC model design is guided by section 18 and informed by considering the outcomes that a TSLRIC price may promote.[4]

There are many modelling issues for which there is no clearly defined approach set out under the Act. Where this is the case, if the Commission is faced with a choice regarding two (or more) approaches it should follow on a particular modelling method or parameter, we believe it must give effect to that method or parameter that is more likely to meet the underlying purpose set out in section 18 of the Act. In this regard, section 18 of the Act states that:

> (1) The purpose of this Part and Schedules 1 to 3 is to promote competition in telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand by regulating, and providing for the regulation of, the supply of certain telecommunications services between service providers.
>
> (2) In determining whether or not, or the extent to which, any act or omission will result, or will be likely to result, in competition in telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand, the efficiencies that will result, or will be likely to result, from that act or omission must be considered.
>
> (2A) To avoid doubt, in determining whether or not, or the extent to which, competition in telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand is promoted, consideration must be given 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 suggests that an approach to TSLRIC modelling that does not promote competition for the long term benefit of end users; would result in inefficiencies; and/or provide disincentives to investors in new telecommunications services to innovate would be likely to be contrary to the underlying purpose of the Act.

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4 Commerce Commission, *Issues Paper*, at para 56 on pps 17-18.

2.3 Application of an extreme approach to TSLRIC will undermine the purpose of the Act

The legislation does not provide a definition of what is meant by forward-looking costs. Further, it provides no specific direction on the appropriate treatment of existing sunk assets.

It is arguable, on its face, that forward-looking costs could just mean the costs in the future of providing the service, i.e. future incremental costs, which would exclude the costs of sunk assets. Such an approach would be consistent with static allocative efficiency, as sunk costs are by their nature fixed costs and economic welfare would be maximised by setting prices to reflect future, incremental costs. However, from a dynamic perspective, such an approach could involve an expropriation of the existing sunk assets[5], which would likely have a chilling effect on further investment in the future. This is because investors would likely consider that future investments could be similarly expropriated.

Another extreme would be to ignore the existence of sunk costs and simply calculate the costs of a 'greenfield' operator building a network from scratch today. However, such an approach has the potential to over-compensate the operator, by paying the operator as if it had overbuilt the existing assets completely where the efficient approach would be to overbuild the existing assets only where a lower cost alternative was available and continue operating the sunk assets where overbuild would result in higher costs. This would result in clear consumer detriment; effectively involve an unwarranted transfer from consumers to investors; and would create poor incentives for efficient investment in the future.

Based on our experience in other jurisdictions, we believe the forward-looking costs of a network means the costs that would be incurred if an efficient network operator were to build a network to provide the service today, taking account of the existence of sunk assets.

2.3.1 A narrow view of a hypothetical new entrant's costs are not appropriate for setting LLU prices

The Commission defines forward-looking to mean:

> … the costs that a network operator would incur if it built a new network today using assets collectively referred to as the modern equivalent asset … The costs of these

5 Assuming the costs incurred in building the sunk assets have not already been fully recovered through past pricing of the services provided over the assets (i.e. assuming the assets had not been fully depreciated already).

> assets are the costs of currently available equipment as opposed to the costs of older equipment that may actually still be in use.[6]

This notion is consistent with the 'philosophy' of the MEA concept, which is to try and capture efficiencies. That is, if a provider could reproduce the service today using MEA that are more efficient, then it would be undesirable to use the legacy asset costs as this would result in higher costs/prices than would be efficient.

At other points in its Issues Paper, the Commission appears to equate this with the concept of the costs that would be incurred by a hypothetical new entrant to the market for the supply of the UCLL:

> A TSLRIC analysis is concerned with calculating the efficient set of network costs that a hypothetical new entrant operator would incur.[7]

We believe it is important, however, not to confuse the notion of a forward-looking network with a 'greenfield' network. That is, taken to its logical extreme, one could imagine that a hypothetical new network means a hypothetical greenfield network that would be built today if the network were entirely rebuilt by an operator, with no sunk costs, using only MEAs. One might go further, and assume such a modelling approach requires a regulator to cost a new greenfield network at every point in the future when a regulatory reset occurs.

We believe, however, that such an approach to modelling the TSLRIC of the UCLL is not consistent with the most efficient way of building a new network to provide the service today. This is because, in reality, investment decisions in access networks are made sequentially over time, with current decisions being made taking account of existing sunk assets, rather than on a greenfield basis. For this reason, it is highly unlikely that any party will ever build a complete network based solely on MEAs, and even if they did the network would likely depart from an MEA network over time as it would be more efficient to continue to use existing sunk assets than continually upgrade to the MEA.

This is illustrated through the approach of many present network operators that are deploying new NGA networks. For instance, in Australia, the National Broadband Network Company (NBN Co) did not seek to build an entirely new greenfield network when it was originally seeking to deploy a fibre to the home (FTTH) broadband network. Instead, it negotiated access to key existing infrastructure, such as the trenches and ducts that Telstra had already deployed to provide copper-based services to consumers. Similarly, mobile network operators do not seek to completely overhaul existing networks when transitioning from one network technology to another. That is, when upgrading a mobile network

6 Commerce Commission, *op. cit.*, at para 68 on p. 20.

7 Commerce Commission, *op. cit.*, at para 90 on p. 25.

from 3G to 4G, mobile network operators will seek to use many existing network towers to roll-out their new networks.

2.3.2 Adherence to a pure hypothetical new entrant concept would create perverse incentives

Not only is a greenfield network far removed from the type of network an efficient new entrant would be likely to build in reality, setting the price of the UCLL on the basis of the modelled cost of such a network would create a number of perverse incentives:

- To the extent that a pure MEA/greenfield approach leads to higher cost estimates, it would dis-incentivise the access provider from investing in new technologies or upgrading its network to reflect MEA where this involves incremental costs[8]. This is because the access provider will be compensated through the price of the service as if it is making investments in the MEA even if it does not. Instead of incurring the costs of investing in new infrastructure, it will have an incentive to "sweat" existing assets at no additional cost to it, while earning revenue as if it had upgraded its network. Put another way, if the operator is compensated as though it had invested in the MEA, even if it does not incur the cost of doing so, it has no incentive to incur these costs.[9]
- It can create disincentives for investments in other telecommunications infrastructure. Re-optimisation of a network – and particularly the prospect of re-optimisation at future regulatory resets – creates considerable uncertainty for investors in telecommunications infrastructure and would not be likely to promote the objective of encouraging innovation and new investment in line with section 18(2)(a) of the Act. For instance, an access provider may fear that, over time, innovation may mean that the cost of MEAs declines over time. Accordingly, the cost base it is able to recover through access pricing would decline at each regulatory reset. In the absence of any appropriate adjustment of the depreciation profile that allows for the recovery of the capital costs incurred by the access provider, the access provider faces the risk that constant re-optimisations of its network for cost modelling purposes will prevent it from ever being able to recover the actual costs it has incurred when building the network. While a regulator can seek to adjust for this problem by adopting a tilted annuity approach to depreciation payments (as discussed further in section 3 below), unless expectations about

8 For example investments in fibre will increase the operator's cost base compared to maintaining the legacy copper network.

9 To some extent, this disincentive may be less extreme in New Zealand because Chorus faces roll-out targets it must achieve for the deployment of an ultra-fast broadband network. These incentives are still likely to be relevant, however, in non-UFB areas that remain in Chorus' network.

future price paths for assets set at the commencement of each regulatory period are exactly realised, the access provider will face the prospect of substantial windfall gains or losses.

- It can lead to a disassociation between the actual costs incurred in providing the services and the costs that are modelled to be incurred, because the access provider will be being compensated at a cost rate that may bear little resemblance to the actual costs it faces and has previously incurred. This is especially the case if there are frequent regulatory resets/re-optimisations. While there can be some positive incentive effects created when an access provider tries to lower costs below the price of costs modelled by the regulator, an outcome where the price of the service bears increasingly less resemblance to the actual cost of the service can lead to allocative inefficiencies and a loss of social welfare.
- Where legacy assets are largely depreciated, there should be no need to allow additional depreciation in access charges based on the costs of investing in a hypothetical new network that will not actually be built by the access provider. In turn, this has the effect of raising prices further above the actual incremental (and marginal) cost of providing the service in a way that further reduces allocative efficiency

All of these issues are likely to lead to outcomes that are contrary to the underlying purpose of the Act. They also explain why regulators such as the ACCC have moved away from pricing unbundled local loops on the basis of a strict TSLRIC methodology. In making this decision, the ACCC noted that:[10]

> The ACCC has for some time noted the limitations of a TSLRIC approach to the pricing of fixed network legacy services and has expressed that view in a number of recent decisions and consultations.
>
> ...
>
> The ACCC ... recognises the extensive debate among industry participants regarding the appropriate approach to determining access pricing for fixed line telecommunications services. The ACCC has in particular noted its view that, when setting regulated access prices, regulatory certainty would be promoted if the value of the assets used to provide the regulated services was locked-in, rather than continually re-valued at each regulatory reset.36 It has also noted that the ‘build or buy’ rationale for continually re-valuing the asset base may not be as strong as initially envisaged.

That said, setting prices entirely on the basis of actual/historic costs incurred by the access provider could also create perverse incentives of its own. The economic and regulatory literature recognises the risk that compensating a regulated firm in a way that allows it to recover the actual costs it incurs provides

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10 ACCC, *Pricing principles and indicative prices for LCS, WLR, PSTN OTA, ULLS, LSS 1 August 2009 to 31 December 2010*, December 2009, p.13.

it with little incentive to pursue productive efficiencies. This is because the firm is able to recover whatever costs it incurs irrespective of whether these costs were efficiently incurred or not. This can provide incentives for 'gold plating', whereby firms incur excessively large costs in the knowledge that the regulator will allow it to recover these costs (plus a return on them in the case of capital costs).

Relatedly, the economic literature shows that a guaranteed rate of return on whatever capital costs are incurred can provide an incentive for regulated firms to inefficiently over-invest in capital relative to other factors of production that could be used to provide its services. This is sometimes referred to in the literature as the 'Averch-Johnson' effect.[11]

While incentives to invest inefficiently under models based on actual/historic costs can be mitigated to some extent via the use of appropriate prudency measures aimed at ensuring efficient investment in infrastructure, there are still considerable difficulties involved in regulating access providers to achieve efficient investment outcomes.

2.4 Key principles that should guide the Commission

The foregoing analysis suggests that the application of a pure hypothetical new entrant approach to modelling the TSLRIC of the UCLL can give rise to outcomes that are inconsistent with the overarching purpose of the Act. On what basis, then, should the Commission make decisions regarding the appropriate way to model the TSLRIC of the UCLL?

In our experience, regulatory regimes associated with cost based pricing of unbundled copper local loops take their direction from various combinations of the following underlying objectives:

- ensuring efficient use of existing infrastructure
- providing a reasonable expectation of certainty of cost recovery for investors to preserve efficient incentives for parties to invest
- providing incentives for access providers to minimise their costs when providing the service
- providing correct build or buy incentives for potential access seekers who might otherwise build their own infrastructure to provide the service, where relevant
- mitigating any inefficiencies from past investments
- seeking to replicate outcomes of effectively competitive markets.

11 See Averch, H and Johnson, L., (1962) "Behaviour of the Firm Under Regulatory Constraint", *American Economic Review*, 52(5): 1052-1069.

In many cases, however, these objectives conflict with each other when it comes to deciding an approach to model the cost of an unbundled local loop.

For instance, if a regulator focuses on making the most efficient use of existing assets, it is more likely to choose a modelling approach that recognised that the cost of much of the infrastructure used to provide the service is sunk. Accordingly, they are more likely to use some kind of building block regulatory model to set prices for access to the service, and set the opening value of the regulatory asset base equal to the depreciated historic cost of the assets in the network. From there, allowed regulated revenues include recovery of the remaining undepreciated value of the network assets via future depreciation payments, and any future prudent capital expenditure can be "rolled into" the asset base. Such an approach, however, would likely be in conflict with creating efficient build/buy incentives for potential new entrants, if or where efficient entry is feasible. This is because the cost of the service is estimated by focusing on allowing investors to recover the costs of existing infrastructure – and not on the costs of building a new efficient network today.

Accordingly, the Commission will be unable to settle upon a single set of modelling decisions if it applies equal weight to all of these objectives. Instead, the Commission will need to prioritise those objectives that are most likely to help it make decisions that will lead to the achievement of the purpose of the Act.

In our view, there are five key considerations the Commission should have regard to when seeking to prioritise which regulatory objectives are most likely to lead it to setting prices for the UCLL that best meet the underlying objectives of the Act. These are set out below.

2.4.1 Any efficient network must be designed with regard to the utilisation of existing sunk assets

Determining a modelling approach by attempting to proxy effectively competitive markets adds little to the other considerations around model choice because effectively competitive markets have few easily agreeable characteristics when it comes to monopoly infrastructure. In this respect, we note the Commerce Commission has previously observed that:

> Unlike theoretical economic models of competition such as perfect competition and perfect contestability, workable competition does not come with a set of pre-defined conditions for long-run equilibrium that dictate what the associated set of outcomes must be." *Input methodologies, Draft Reasons Paper, 2010*[12]

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12 The Commission also said: "In a regulated market context, where an incumbent supplier uses long-lived specialised assets to supply services and, as a result, can supply the market over time at a lower cost than a hypothetical new entrant, it would be inappropriate to use the characteristics of the

As indicated earlier in this respect, competitive markets tend to optimise over time – not instantaneously. We believe this supports a view that the appropriate approach to modelling the TSLRIC of the UCLL would involve focusing on the efficient way to provide network services today, taking into account the existence (and utilisation) of existing sunk assets. This is more likely to be consistent with how efficient firms would build a network to provide the service; and is unlikely to be consistent with a full greenfield network. Such an approach has implication for the optimal level of optimisation contained in the Commission's TSLRIC model (see section 4 below).

2.4.2 Focusing overly on build-buy incentives reflects a legacy approach to regulation that is no longer as relevant

When cost-based models were initially being developed to set prices for access to telecommunications infrastructure, it was considered crucially important that access prices provided the right 'build or buy' incentives for potential access seekers. This was because, at the time, it was considered important to provide incentives for competitors to legacy networks to deploy their own infrastructure where possible to promote facilities based competition over the provision of telecommunications services.

There is increasing recognition today, however, that large parts of the access network may never be duplicated. This means that the need to ensure that access seekers face appropriate 'build or buy' signals cannot be expected to be a material factor in valuing the related network assets, if they are not expected to be built by an alternative operator. As noted by Davis in the context of telecommunications access pricing in Australia:

> The 'build or buy' motive for using TSLRIC is now recognised as being significantly oversold – if not entirely discredited. The ACCC now accepts that, despite expectations that there was a greater potential for infrastructure-based competition in telecommunications than in other regulated industries, Telstra's copper customer access network was "more of the character of an enduring bottleneck" (ACCC 2009, 16)[13]

There is also increasing recognition that, even where assets are replicable, the decision to build or buy will not only be influenced by current regulated access prices, but by future prices once entry has occurred.

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higher cost hypothetical new entrant as a benchmark for setting or monitoring the prices of regulated suppliers."

13 Davis, W., (2011) "From futility to utility – recent developments in fixed line access pricing", *Telecommunications Journal of Australia*, Vol 61, No. 2.

This suggests that the Commission should recognise in its modelling decisions that the motivation for the right build or buy incentives is likely to be relevant only to some part of the overall assets used to provide access, and reflect this in its approach to the valuation of the corresponding assets.

2.4.3 Incentives for efficient investment will best be created by an approach to modelling that delivers more certainty

In the past, regulators considered they were dealing with significant legacy network inefficiencies. This explains the use by some regulators of approaches to setting prices for regulated services based on the hypothetical cost of building a network from new today.

The emergence of NGA networks, however, has meant there is now less concern about 'punishing' the inefficiency of legacy networks and more emphasis on providing appropriate incentives for future efficient investment. One way to achieve this is by developing approaches to regulation that provide more certainty about the recovery of future investments.

In our view, this suggests the Commission should set prices in a way that involves fewer re-optimisations of the network modelled to provide the UCLL over time, and fewer regulatory resets.

2.4.4 Revaluation windfalls for Chorus would be inconsistent with the purpose of the Act

In determining whether a particular act or omission is likely to promote the purpose of the Act, the Commission is directed to have regard to the efficiencies that will result, or will be likely to result, from that act or omission. When applied to decisions regarding particular modeling approaches, we believe the Commission must place significant weight on whether a decision would be likely to result in all forms of efficiency – including allocative efficiency. In the context of pricing the UCLL, this implies that prices should not depart too far from the actual incremental costs of providing the services. Hence, costing methods that are too heavily focused on the costs of a hypothetical network that is far removed from the actual network being used to provide the service are at risk of creating a divergence between prices and actual costs.

This is especially the case if the approach to modeling involves significant upward revaluations; and allows Chorus to recover the capital costs of hypothetical infrastructure investments it has not made; or in circumstances where it may already have largely depreciated the cost of the legacy copper network that it continues to use to provide the services. Such an approach has the potential to allow Chorus windfall revaluation gains that would have the effect of driving prices for the UCLL above the efficient costs it will face when providing the service, thereby generating allocative inefficiencies and losses of consumer welfare.

2.4.5 The Commission must be wary of approaches that cherry-pick inconsistent features of different models

As indicated above, there are many different approaches to cost modelling adopted by regulators in different jurisdictions. A partial reason for this is the different regimes that exist in different countries, and the effect this has on the way individual regulators seek to prioritise competing regulatory objectives.

In our view, it would be desirable that the Commission's approach to modelling decisions be consistent with the overriding objectives of the Act. In particular, the focus should not be entirely on the appropriate approach on individual modelling decisions in isolation. It would be best to focus on whether the overall package of modelling choices is internally consistent in a way that is, cumulatively, likely to meet the requirements of the Act.

3 Core recommendations that are invariant to the choice of asset being modelled

Section 2 discussed the key considerations we believe should guide the Commission when modelling the TSLRIC of the UCLL. Although this discussion suggests the Commission has a reasonable degree of discretion with its choices, our view is that it must be careful to consider both the individual and cumulative aspects of its modelling choices on the achievement of the purpose set out in Section 18 of the Act.

Based on our consideration of matters specific to the New Zealand regulatory regime and our experience working within cost models in overseas jurisdictions, we believe there are a number of core modelling approaches that the Commission should follow for estimating the TSLRIC of the UCLL. We refer to these recommendations as our "core recommendations".

There are, however, some other recommendations that relate to the type of network that should be modelled. In particular, we believe the Commission should take a different approach to modelling the TSLRIC of long-lived assets (such as ducts and trenches) compared to the approach it should take to modelling the TSLRIC of more short-lived assets (such as copper loops). Depending on the type of asset being modelled, we recommend different approaches to the valuation of these and whether there should be any roll-in of new capital expenditure over time. We refer to these recommendations as "contingent recommendations".

In this section of our report, we set out our core recommendations; while the following section of our report sets our contingent recommendations.

3.1 The Commerce Commission should develop its own TSLRIC model

At the outset, we believe that whatever approach the Commission takes to modelling the TSLRIC of the UCLL, it should seek to build a model of its own rather than ask Chorus to undertake the task of building a model for it. In our experience, it is best practice for regulators worldwide to develop their own models. This is because it enables the regulator to have control over methodological decisions involved in the modelling exercise. If Chorus were to hold different views to the Commission on the appropriate approach to model the TSRLIC of the UCLL, it would naturally seek to develop a model that reflects its preferred modelling approach. If the difference in view on some matters is significant, it is likely it would be difficult (if not impossible) to make minor tweaks to Chorus' model to ensure it meets the Commission's preferred approach.

3.2 The Commerce Commission should build a bottom-up model

There are three main methods of estimating network costs:

1. A top down financial approach, where the cost of the network is based on financial inputs such as the level of capital expenditure and depreciation charges to date;
2. A top down engineering approach, where the volume of assets in service in the network (network dimension) is estimated based on the actual network and the relevant asset base is costed using a methodology such as current cost accounting (CCA);
3. A bottom up approach, where the volume of assets in the network is modelled (and costed) based on a combination of data on end user locations, and demand and engineering rules.

Both top down and bottom up models tend to include some level of hybridisation. For instance, top-down models are often informed by engineering models,[14] where the vast majority of the capital employed from the financial accounts is simply discarded and replaced by 'CCA' valuations based on what amount to subjective judgments by engineers and accountants. Similarly, bottom up models are often cross-checked against information from the operator for reasonableness.

It is important to note that the various approaches are typically only applied to capital costs. The costs of operations and maintenance of the access network can be difficult to model, and typically vary widely between operators in different jurisdictions. This reflects the non-tradable nature of most of the inputs, which are typically labour costs. As a result, many regulatory cost models use the operator's existing operational expenditure on operations and maintenance as a starting point for their assessment of these costs, and consider the submissions of parties on whether these represent prudent, efficient costs.

Bottom up models typically provide more flexibility. They allow hypothetical networks to be modelled and depreciation approaches based on estimates of future demand to be applied.

While top down models have been used to set local loop prices in some jurisdictions, in particular in the UK, regulators have increasingly favoured bottom up approaches. This is partly because cost data from a top down network is invariably thought to embed inefficiencies that are hard to remove or adjust for without effectively building a bottom up model to compare with the top down information.

14 This might be done, for instance, to estimate current costs of legacy equipment.

A further significant issue, in our experience, has been that top down information may not be of sufficient quality to produce reasonable results. Sometimes this is a function of the incumbent being unwilling to cooperate with the regulator but often this is a function of incomplete and inaccurate databases. This reflects the fact that some assets, such as ducts, in the access network may have been installed half a century ago in a monopoly environment, where record keeping was limited. Even where databases have been refreshed over time, such an exercise typically takes a number of years and as such the current databases may be incomplete or only cover a fraction of the network.

The hybrid approach referred to by the Commission is a means of trying to ground the bottom up analysis in some form of reality by providing a cross-check. For example, the units of inputs may be assessed for consistency, even if the values for the assets are derived from other (current) sources.

We believe the Commission should develop a bottom-up model for the purposes of estimating the TSLRIC of the UCLL. It follows from the principles we have discussed in Section 2 of our report, however, that we do not favour a bottom up model that is entirely divorced from reality. Hence, where possible, we believe it would be desirable to reconcile or cross-check the bottom-up model against top-down data.[15] In reaching this conclusion, we note that:

- The ability to cross-check against top-down data will depend critically on the Commission's ability to access reliable data from Chorus, and conduct such a cross-check in a timely fashion.
- A cross-check against top-down data is only sensible for those asset types where the Commission seeks to take into account existing network elements. As we shall discuss further in Section 4 of this report, this should include long-lived assets (such as ducts) and, depending on the approach to the MEA adopted by the Commission for loops, may involve copper and fibre assets.

3.3 The Commission should develop a scorched node model that retains existing MDF locations

3.3.1 Reasons to implement partial optimisation

In theory, a fully "optimised" model would not draw on any assumptions from the existing network but would begin from a clean sheet of paper. In practice, however, bottom up models usually draw to some extent on the existing network for their assumption set, in terms of network topology and equipment types and

15 For instance, a recent bottom up LRIC model in Austria estimated full ULL cost at 15 Euros per month, when the implied full ULL price derived from subtracting from average retail revenues the downstream costs was just 5 Euros.

mix. For example, bottom up models of the "core" switching and transmission network often assume that the locations of switch sites are the same as in the existing network, a so called "scorched node approach".

There are two fundamental reasons for adopting an approach that limits the degree to which the network topology is optimised:

1. As noted in section 2, given the large capital costs involved, and the relatively long-lived nature of most network assets, it is not efficient for operators to re-optimise their network frequently. This applies to network topology as well, where there may be significant investments in certain locations such that the ability to revise the topology of the network is limited. For example, the complexity of customer connections at the MDF makes it extremely costly to move the location of a MDF, with such moves only taking place in extremis, when an existing site becomes unviable; and

2. Using assumptions from the existing network may simplify significantly the estimation of efficient costs by constraining the estimation process and limiting the number of calculation steps. In particular, the modelling of some network characteristics, particularly those related to geo-spatial location, may be highly data intensive and the results of any modelling may be dependent on the algorithms used (for example clustering algorithms used to estimate an optimal number and location of nodes).

Further, if the Commission builds a bottom-up network that retains some existing network elements, it would be easier to compare outputs with the actual network to see the implicit efficiency assumption applied and to ensure that the model is robust.[16]

That said, care should be taken not to over-account for existing network elements. There can be disadvantages in drawing on the existing network as a source of assumptions because existing networks may include some degree of inefficiency. Hence, the extent to which the network design should be optimised (or "scorched") is a matter of judgement and degree.

3.3.2 Degrees of optimisation in access networks

While the decision of the level of optimisation is often seen as a simple choice between "scorched earth" and "scorched node", we believe there is a more subtle hierarchy of potential degrees of optimisation that may be pursued:

1. Revaluation. The existing network infrastructure could be maintained, i.e. an inventory of assets drawn from Chorus's information systems

16 For example, the overall route distance is a typical cross check applied to the results of bottom up models to ensure the results are credible.

with optimization simply being a revaluation based on the efficient costs of replacing the network.

2. Re-dimensioning. The existing network topology could be maintained in terms of cable routing and nodes with the optimisation solely based on improving utilisation rates. This might be achieved, for instance, by re-dimensioning cables and associated infrastructure. For instance, if ducts are currently laid on both sides of a road in an area of low population density, it may be appropriate to correct this in an optimised network.

3. Re-routing. The existing nodes (MDFs, distribution points) could be maintained but with a recalculated optimal routing between the nodes and from the nodes to the premises based on least cost routing.

4. Re-siting ("scorched node"). The number of network access sites and intermediate flexibility points in a network might be reduced in an optimised model. Alternatively, the siting of MDFs or Distribution Points (DPs) could be optimised to take account of the characteristics of current technology.[17]

3.3.3 Appropriate level of optimisation

Given that UCLL services will be delivered at the existing MDF sites, and hence the access seekers will be paying for the costs of the access network from these nodes to the end users' premises (and will pay for the backhaul from the MDF site to their core networks), we believe the MDF locations should be fixed in the bottom up model for the UCLL even if these are not the access nodes that would be used in an MEA network.

Subject to this constraint, the Commission should build a bottom up model that seeks to estimate the minimum cost network in terms of duct and cabling required to connect up the MDF sites to end user premises, based on the assumed future demand for the network. In doing so, the model should seek to minimise the overall length of the duct network (given that duct is the largest cost item in the access network).

Cable routing through this minimum length duct network should aim to minimise the overall cost of cables and associated infrastructure and installation. For instance, the high cost of splicing fibre cables suggests the Commission should choose a topology that reduces the number of splices involved in its modelled network.

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17 For instance, the number and location of existing MDFs will reflect the requirements of a copper PSTN technology, which may no longer be appropriate in an MEA context.

The results of the algorithm used to dimension the network in this way should be cross-checked against actual data to ensure that the outputs are reasonable and reflective of achievable efficiencies.

3.4 The two MEA options

3.4.1 Taking account of legacy infrastructure

It is reasonable to assume that, in the absence of existing infrastructure, an operator building a new national scale network would not choose to design and build a network in a way that is consistent with the design of existing twisted pair copper cables. However, this hypothetical case does not reflect the situation in markets where there is an existing copper-based network. While a few incumbent operators have rolled out fibre-based networks replacing fully existing copper networks, such "fork lift" replacement of existing assets is the exception rather than the norm[18]. Other operators (such as BT) have enhanced the capability of the access network by building overlay networks, while continuing to use the existing sunk assets of the network.

This mix of legacy and modern technology reflect a long run view of efficiency in that an operator will seek at each point to make the investments required to meet future expected demand in a way which will minimise future expenditure. This approach contrasts with a short run view of efficiency, which assumes that at every point in time the cost base should reflect the network that would be built on a greenfield basis using the modern equivalent asset.

A short run view of efficiency may be an appropriate approach in markets where barriers to entry are low, with the result that market prices are set by entrants or potential entrant, using the most efficient modern technology. In this case prices should reflect the cost of the MEA even where operators are still operating legacy technology. However, regulators have recognised that, in markets with significant sunk costs and high barriers to entry, efficient prices will reflect a mixture of technologies. For example, bottom up LRIC models developed for the purposes of setting mobile termination rates have generally included a mix of legacy technology (e.g. GSM) and current technology (e.g. UMTS). This reflects the fact that mobile markets, while sufficiently competitive to ensure strong cost minimisation incentives, are characterised by long transitions between technologies reflecting the fact that sunk costs (for example in network infrastructure and handsets) make it inefficient to replace rapidly one technology with another.

18 Indeed some operators such as Verizon (FiOS) have significantly scaled back fibre roll pout despite strong regulatory incentives to replace highly regulated copper networks with largely unregulated fibre networks.

Access networks are characterised by very high barriers to entry and very high levels of sunk costs, even compared to mobile networks. As such, it is reasonable that even in a competitive market, prices would be set to reflect the forward looking cost base of an operator operating an efficient mix of technologies, taking into account sunk costs when deciding on the forward looking technology to be operated.

Thus, we believe it is consistent with a forward looking view of costs, to have some regard to sunk assets. This would support a MEA that reflects a mix of technologies rather than simply reflecting the technology that a "greenfield" operator would build.

A major benefit of this approach is that it would eliminate the need to make significant 'performance adjustments', which is necessary under an approach which uses a predominantly fibre network as the MEA. Whilst the existing Chorus network, which contains some fibre and some copper, may be superior to a strictly copper service (the UCLL), it is closer in network performance that is a predominantly fibre-based service.

For assets that are to be replaced in a future network design, this MEA approach which takes account of existing assets presents some challenges. For example, copper cable currently running from exchanges to the cabinet ('E-side' cable) will be replaced by fibre in either a fibre-to-the-curb (FTTC) or fibre-to-the-premises (FTTP) roll out.

For these types of asset, the Commission will face a number of issues, including the following:

1. The replacement unit cost of copper cable has increased significantly in recent years due to increase copper commodity prices;
2. A significant proportion of the asset base may be fully depreciated but other assets may have significant net (book) value which could be stranded if the copper network is closed – although copper cables may have significant scrap value which could be recovered at this point;
3. As demand for CGA services falls over time, measured unit costs could rise due to reductions in economies of scale;
4. If the resulting UCLL prices are too high or too low, this could affect the incentives to migrate to NGA services.

One approach that has been used to address these issues in a conceptually-consistent way was developed by Ofcom. Its 'anchor pricing' approach sets prices for copper services on the basis of the hypothetical operator continuing to operate the legacy network. Ofcom's rationale for this approach is discussed further in **Box 1**.

Box 1. Ofcom's anchor pricing approach

In periods of technological change, such as the transition from CGA to NGA networks, Ofcom has adopted a so-called 'anchor pricing' approach, where prices are set on the basis of the hypothetical operator continuing to operate the legacy network.

Ofcom's rationale is that during periods of transition, with dual running of networks, unit costs measured using standard approaches will tend to increase due to reductions in economics of scale, as the demand on the legacy network falls and the new technology network is not yet fully loaded. Setting a price based on the legacy technology with full economies of scale will provide incentives for the regulated operator to efficiently transition to new technology as the transition will occur due to some combination of:

- The modern technology providing lower costs in the long run, allowing the incumbent operator to increase profitability if prices are kept at the 'legacy level' for equivalent services; and
- The modern technology provides increased capability, which customers are willing to pay sufficiently more for to fund the additional costs required.

Ofcom is currently applying this approach to LLU costing, setting the price based on a top down approach, but assuming no reductions in economies of scale in the forecast period.

3.4.2 A predominantly fibre MEA

As noted above, in markets with high sunk costs, it is likely that there will be dual running of technologies, due to the existence of sunk costs. In markets where the services offered by the new and old technology are indistinguishable, the price will tend to reflect the MEA, with the value of the legacy network essentially reflecting the MEA.

Where the services offered by the two technologies are distinguishable albeit potentially partial substitutes, in competitive markets there will typically be some differential between the prices paid for services based on the legacy technology and that based on the current technology.

In the case of the transition from copper to fibre, the services that can be delivered over copper are effectively a subset of the services that can be delivered over fibre (i.e. ADSL can deliver low bandwidth broadband services while fibre can deliver both low and high bandwidth broadband services). We would expect some price discrimination with the price of the subset of high bandwidth fibre services to be higher than the low bandwidth services that can to be delivered over copper.

One potential approach to this would be to model a predominantly fibre MEA network and then make adjustments to reflect the lower utility of copper services. In addition, we note that fixed wireless technologies may in some instances offer lower performance than a copper network. Any TSLRIC modelling based on such an MEA would also need to make appropriate performance adjustments. Failure to make such adjustments would likely result in access prices that reflect a level of network quality that does not correspond to the network that will actually deliver the UCLL service.

While such a methodology may be theoretically attractive, there are considerable difficulties in applying such an approach practically in a way that results in prices for both fibre and copper-based services that approximate the prices that would prevail in a hypothetical competitive market.

At this stage, we have not been instructed to address how such performance adjustments should be made. However, we simply note that if the Commission were to pursue a non-copper MEA approach to TSLRIC modelling, it will necessarily have to tackle the issue of how to make reasonable and robust performance adjustment to avoid perverse economic outcomes.

If the Commission favours a predominantly fibre MEA, adjusted to take account of the reduced capability of UCLL services, we would expect the resulting prices to be at or below the level of an anchor based approach, i.e. that customers who do not take advantage of the higher capabilities offered by NGA investments should not be required to pay increased prices to cover the costs of investments.

3.5 The Commission must allocate common costs to recognise the existence of shared infrastructure

Common cost allocation is a significant issue in any kind of cost modelling where services are delivered using shared assets.

In this regard, there are two key modelling issues that need to be addressed when undertaking TSLRIC modelling:

- how much cost is shared between the UCLL and other services which make use of the same assets; and
- how any such costs should be allocated between the UCLL and other services which make use of the same assets

In our view, there are two main types of sharing that need to be accounted for in the commission's TSLRIC model:

- those assets that are common to the provision of services over both the core and access network; and
- those assets that are common to the provision of both CGA and NGA services.

Issues relevant to the allocation of costs under both these sharing scenarios are discussed in turn below.

3.5.1 Sharing between core and access networks

The Commission indicates in its Issues Paper that common costs should be allocated using a markup approach once the analysis of cost causality is exhausted. It favours an equi-proportionate mark-up (EPMU) approach, which has been widely adopted by regulators in other jurisdictions. This approach can be supported on the basis that it is transparent, and relatively easy to calculate. Having said that, the modelling decisions themselves can have some influence on how much cost is considered to be common – and therefore would need to be allocated between the services.

The issue that is not broached directly by the Commission is how many services should be modelled as part of the modelling process. If, for example, only the UCLL service is modelled, then the estimate will not be of TSLRIC but of stand-alone cost. All common costs would effectively be allocated to the UCLL. We believe this would be undesirable. To the extent there is some sharing of assets, failure to account for this and allocate some common costs to other services would unreasonably inflate the costs that needed to be recovered from the provision of the UCLL.

As the Commission also notes, the further issue of relevance here is how significant 'shared costs' are – that is, those costs shared in the CAN – versus 'non-network' and 'network' costs. Our view is that greater transparency in the modelling decisions can provide a better picture of the actual level of cost sharing that is going on.

For example, in Australia, Analysys-Mason produced a model of both the core and access networks, and modelled the following services:

> The Analysys cost model includes all services — both data and voice — currently being provided on the Australian fixed network to capture benefits of economies of scale and scope. This is particularly relevant in a next-generation environment where both voice and data services are delivered on a single platform. A minimum set of all services (declared and non-declared) provided on the fixed network has been modelled, since a proportion of the network cost will need to be allocated to these services. (ACCC discussion paper, 2008)

Notably, these issues had been a source of considerable controversy in previous modelling exercises. Although the modelling approach did not resolve all cost allocation issues, it did highlight the extent of sharing possibilities. For instance, the extent of trench sharing between CAN and core networks was estimated at 18 per cent. On that basis, 18 per cent of trenching costs were determined to be shared costs, and 50 per cent of that cost was allocated to the core network.

The risk for the Commission is that if it does not specify the extent of other services to be modelled, it will have little ability to critical examine the sharing options available to the access provider.

We note that this is consistent with a view previously held by the Commission:

> The total service should in principle include all services that use the assets used by the designated interconnection services. This definition of the total service takes into account the access provider's provision of other telecommunications services, in the sense that these services share costs with interconnection services. This should lead to an appropriate range of services over which to allocate the assets' costs. (Commerce Commission, 2004)

A final issue that is raised is the potential for sharing of assets with other utilities. Commonly, this will be power poles but might also relate to trenching in some circumstances. To the extent that sharing of facilities leads to cost savings, it would be relevant to take these into account in its modelling. The LFC rollouts should provide some indication of the kinds of sharing possible.

We consider that:

- A wider set of services than just the UCLL should be modelled, including all access services.
- Consideration should be given to either modelling explicitly the core network, or further consideration given to trench-sharing possibilities between the CAN and core networks.
- Consideration should be given to the extent of other kinds of sharing that might be possible, including trench and pole-sharing.

3.5.2 Assets common to CGA and NGA

Assets that are common to CGA and NGA will include re-usable infrastructure such as trenches, ducts, poles, chambers and cabinets which can either be used for both NGA and CGA networks in parallel (for example where sufficient duct space is available to lay fibre cables alongside existing copper cables) or can be re-purposed when copper cables are removed.

Where fibre to the cabinet is used to deliver NGA services (i.e. VDSL services), the copper cable from the street cabinet to the premises ('D-side' cable) will be used for both NGA and CGA.

The appropriate depreciation approach and net asset evaluation for common assets, which are by their definition sunk cost, requires making regulatory judgements on the objectives of the pricing framework.

Core recommendations that are invariant to the choice of asset being modelled

The costs are common to both CGA and NGA and to a large degree are common to a number of customers. Whilst there is an academic debate on the optimal cost recovery taking into account both static demand side effects (Ramsey pricing) and dynamic effects (optimal migration to NGA), in practice obtaining the data to set such optimised prices is very demanding.

As a result, most regulators have taken a pragmatic approach to the recovery of common access network costs, recovering costs averaged across the territory equally from all customers, independently of the technology they are using (CGA or NGA) and the services they are using (voice, broadband, voice + broadband, standard versus superfast broadband etc.).

This pragmatic approach has two advantages:

- As unit costs are dependent only on the total number of subscribers on the network rather than the products purchased by these subscribers, the unit costs are likely to be relatively stable over time and not subject to significant forecast errors.
- Customer choices between different packages of services will be driven by the specific incremental costs of each package rather than by differences in the recovery of common costs between the services. This should provide the correct incentives for consumers to choose efficiently between packages.

3.6 The model should not adjust network demand

The Commission's Issues paper notes that modelling network demand can be challenging because we are in a network transition phase – from copper technologies to increasing use of fibre technologies.

Our suggested approach on this issue is that the transition does not need to be explicitly modelled by estimating demand on the old and new networks. Rather, the Commission could assume that demand remains constant, which can be justified in slightly different ways depending on the type of asset assumed:

- If follows, from the section above, that for assets common to CGA and NGA networks, such as ducts, the best approach would be to assume that the demand for the common assets is essentially constant. This may be justified on the basis that the assets will experience roughly constant utilisation, even through the transition phase, and the costs will be common between the two networks. Lower demand for the copper network simply means that less duct cost will be allocated to the copper network – keeping unit costs relatively constant. This approach would ensure a smooth pricing path for these assets, which would assist the transition from the legacy network to new fibre networks over future periods.
- For other kinds of assets that will not be re-used, such as loops (copper or fibre), we suggest that these assets are best modelled assuming that the unit

costs of these assets also should remain relatively stable. This approach, similar to Ofcom's anchoring approach, should neither promote nor deter efficient migration (see **Box 1**).

3.7 The approach to WACC must be consistent with the modelled network

At this stage of its consultation process, the Commission has posed four high-level questions regarding the appropriate methodology for determining the Weighted Average Cost of Capital (WACC) allowance in the TSLRIC model:

1. Is it appropriate to use the cost of capital input methodologies (IMs) as the starting point for estimating the cost of capital for the UCLL TSLRIC model?
2. If so, which parameters if any should be updated to reflect the specific circumstances of the UCLL TSLRIC model?
3. Is it appropriate to use the simplified Brennan-Lally (SBM) CAPM for estimating the cost of equity for the UCLL service?
4. Which comparator firms should be used to estimate the beta for the UCLL service?

Given the capital-intensive nature of the service, the access price can be sensitive to the WACC value employed in the TSLRIC model. Further, the estimation of WACC is a complex exercise, and the WACC value is usually very sensitive to the methodology used. Hence, it is important that the Commission consult, in due course, on the details of the WACC approach it intends to use. We understand from the Issues Paper that the Commission intends to do so at a later stage. Therefore, for the purposes of this submission, we have restricted our comments to high-level issues, including those that the Commission has raised.

3.7.1 Use of the IMs as a starting point and areas that require adaption

We agree with the Commission that the IMs are a reasonable starting point for the estimating the WACC. The IM's have been developed through an extensive consultation process, and have been subject to merits review. As such, it would be sensible for the Commission to build on the IMs rather develop afresh a new methodology for the UCLL service.

However, it should be recognised that the IMs were developed for application to firms regulated under Part 4 of the Commerce Act (i.e. electricity networks and gas pipelines). There is no reason to suppose that the risk associated with the

UCLL would match the risks associated with networks regulated under Part 4 of the Commerce Act.[19] As such, the approach to **beta** (which measures the systematic risk of the regulated assets), as set out in the IMs, should be adapted to reflect the specific circumstances of the UCLL. This means that the Commission should:

- take account of the fact that the UCLL service and regulated energy networks likely have fundamentally different risk profiles; and
- ensure that its approach to beta is consistent with the type of UCLL network modelled.

In respect of the second point above, the approach to beta could vary depending on the following assumptions about the nature of the relevant UCLL network:

- **The scope for ongoing network optimisation.** Generally, the greater the frequency and degree of network optimisation, going forward, the greater will be the risk of asset stranding and the more volatile will be returns to the asset owner. Asset stranding risk should, in principle, be taken into account when estimating the WACC. However, as we have argued elsewhere in this paper it would not be sensible to assume extensive, periodic re-optimisation of the UCLL network. The key rationale for periodic re-optimisation (i.e. to send efficient build-buy signals to potential entrants) does not apply in the present case, and ongoing optimisation would likely lead to rising and volatile access prices, which would not promote long-term benefits to end-users. Moreover, the reality is that much of the actual network that will be used to deliver UCLL services is comprised of legacy assets, the costs of which have largely been recovered already. In these circumstances, the risk of actual asset stranding would be very low.
- **Uncertainty over future demand and the choice of MEA.** Conventionally, fibre local loop investments have been assumed to be riskier than existing copper networks, principally due to uncertainty over future demand for fibre-based services.[20] The European Commission has suggested that this incremental risk may be significant, and has recommended to NRAs that it "should be rewarded by means of a risk premium incorporated in the cost of capital."[21] In a world in which customers are migrating away from copper-based services towards fibre-based services, there could also be

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19 These businesses face entirely different demand profiles, cost structures and regulatory arrangements.

20 Other risk factors could include construction cost risks and uncertainty over whether fibre local loop assets would be unbundled once investments have been sunk. See, for instance, OPTA (2008), *Policy rules: Tariff regulation for unbundled fibre access*, 19 December, p.18.

21 European Commission (2010), *Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA).*

significant uncertainty over demand for UCLL services. Arguably, in such a world, investors in such a network would demand a risk premium over and above the WACC for a full copper network with steady-state demand.

The key factor that would give rise to any risk premium is uncertainty over the rate of future uptake of services (rather than any inherent property of the MEA). So, the key assumption that should affect the Commission's estimate of beta is the profile of future demand. If demand is assumed to be roughly in steady state then, regardless of the MEA adopted (e.g. a full fibre network that covers all customers, or a copper-fibre network that covers all customers), no premium for investment risks should be imputed within the beta. However, if the Commission were to assume a transitioning of demand from legacy copper assets to new fibre assets, then it should consider whether a risk premium should be taken into account. However, even if the Commission were to assume transitioning of demand from copper to fibre, it should recognise that the demand for the bulk of the asset base, i.e. ducts and trenches, within any network that it might model will remain roughly stable over time, since these are independent of the MEA.

3.7.2 Choice of comparator firms when estimating beta

We have argued above that, conceptually, the Commission should be clear about the assumed risk characteristics of the network it intends to model, and should then ensure that its estimated beta is consistent with these risk characteristics. In practice, this means that the Commission should choose its comparator firms carefully.

From a practical point of view, it is necessary, for the task of beta estimation, that the comparators selected are listed companies.

Suitable comparators could, potentially, be drawn from New Zealand or from overseas. The only possible local candidate is Chorus. Regulators rarely rely on a single firm to estimate beta; rather, regulators prefer to rely on a sample of firms to minimise the effect of estimation error from any single comparator influencing the overall beta. Hence, the Commission should also use appropriate overseas comparators when estimating beta.[22]

All potential comparators should be checked for suitability. In our view, the key (most pragmatic) criteria the Commission should take into account are the following:

- the comparators should at least be owners of regulated networks;[23]

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22 Indeed, this is the approach adopted in the Commission's IMs.

23 Ideally the comparators should be subject to the same form of regulation as prevails in New Zealand. However, it is unlikely that such comparators exist. Hence, the comparators should at

- the comparators should, within reason, be exposed to a similar degree of reoptimisation risk as the UCLL; and
- the comparators should have a similar level of future demand risk as assumed for the UCLL.

To the extent that the comparators identified do not satisfy these criteria well (i.e. to the extent they are not 'pure play'), the Commission could make adjustments to the estimated betas to take account of this. For instance, it may be that some of the comparators available are currently facing uncertainty over the rate of migration from copper to fibre-based services. To the extent that this uncertainty is material, it would likely be reflected in the companies' measured betas. However, if the Commission assumes a fairly stable demand profile for the UCLL (which we consider to be a reasonable assumption), the measured betas of the comparators would likely overstate the beta of the UCLL. In such circumstances, the Commission should adjust down the betas of the comparators to obtain a more representative measure of betas for the UCLL.[24]

3.7.3 Consistency between the leverage and debt premium assumptions – another area of the IM that should be adapted

Having reviewed the IMs, we recommend that the Commission adapt its approach to determining leverage slightly. The Commission's broad approach to leverage set out in the IMs is reasonable. However, the IMs do not build in any sense-checks to ensure that the leverage assumption supports the credit rating assumption underpinning the debt premium estimate.

Under the IMs, the assumed leverage is determined by reference to the gearing levels of the comparators used to estimate beta. Without suitable sense-checks, this could lead to internally-inconsistent WACC assumptions (e.g. a debt premium that is too high relative to the gearing assumed, or vice versa). We propose that the leverage assumption be sense-checked for reasonableness against the credit rating assumption, and also using recent regulatory precedent from around the world.

3.7.4 Use of the SBM CAPM

The Commission has sought views on whether the SBM CAPM should be employed when determining the WACC for the UCLL. It is well recognised that

least be regulated, even if the form of regulation does not align closely with the form of regulation in New Zealand.

24 One way of quantifying such an adjustment might be to compare current betas (which reflect transitioning demand) and historic betas (which reflect more stable demand).

the SBM CAPM has limitations. For instance, it assumes perfectly segmented capital markets, that dividends are fully imputed; and that investors have the ability to fully utilise imputation credits. These assumptions are unrealistic.

Nevertheless, the SBM CAPM does take account (albeit imperfectly) the tax system in New Zealand. Furthermore, it has been used by the Commission extensively in other sectors for many years. Unless the Commission is willing to alter its approach in other sectors, it would be oddly inconsistent for it to adopt an alternative version of the CAPM when determining UCLL access prices.

Overall, for the present purposes, we consider it reasonable for the Commission to use the SBM version of the CAPM.

4 Recommendations contingent on the asset type involved

In applying the principles we have developed in section 2, we have been mindful that some of the modelling decisions create interdependencies with other modelling decisions. For example, if the Commission pursues a scorched earth approach, there seems little point in developing a 'top down' model because Chorus' actual data will bear little resemblance to the modelled outcome. Conversely, if a top down approach is adopted, then the cost structure will by its nature reflect the actual network rather than a "scorched earth approach".

Our analysis suggests that the key 'pivot point' for many of our recommendations is the type of asset that is being costed within the model. In particular, we draw a distinction between long-lived assets that will be re-used for NGA networks (such as ducts and trenches) and loops (which could be assumed to be fibre, copper or some mixture of both). While section 3 of our report set out those core recommendations that do not vary according to the type of asset being modelled, this section of our report sets out those recommendations that do vary according to the type of asset being modelled. In particular, we find that the type of asset being modelled can have different implications for:

- Whether the opening optimised replacement cost value of an asset should reflect accumulated depreciation or valued as new, and whether subsequently the asset base should allow for the roll-in of new capital expenditure
- The ongoing revaluation and optimisation of assets
- How the value of the asset should be depreciated over time.

Our recommendations on each of these issues – and how they vary according to the asset being modelled – are set out below.

4.1 Long-lived assets that will be re-used should be valued differently from other assets

4.1.1 Valuation of duct assets

The definition of TSLRIC constrains the Commission to choose a forward-looking costing methodology. However, the Commission has a further decision to make about whether the assets valued under this costing methodology are treated as new (i.e. the investment is made instantaneously) or whether the age and state of the existing assets is taken into account (or, equivalently, how long it will be before the existing assets will need to be replaced).

In general, there are two reasons for preferring an approach that takes the existing state of the assets into account:

- It provides a better reflection of the expenditures made by the access provider, and so provides some protection against the access provider being compensated for incurring costs which they in fact never did, and never will, incur.
- It facilitates the rolling in of future capital expenditures at their forecast efficient levels, which will be the actual costs so long as those costs are shown to be prudent.[25]

These outcomes better facilitate the objectives of ensuring the access provider can recover its efficient (forward looking) costs, and making optimal use of the existing infrastructure. This is a particular concern when there have been large increases in replacement costs over time. The ACCC has argued that use of undepreciated costs is problematic for these reasons:

> In contrast to the current approach in telecommunications, this approach links access prices to cost recovery, which reduces the likelihood of end users being charged more than once for the same asset and the opportunities for investment cost over-recovery (ACCC, 2009, p. x).

In contrast, assuming that the assets are built as new divorces ongoing maintenance and capital expenditures from their actual efficient values. It is therefore difficult to conceive of how the access provider can have any real confidence that the costing model will provide a reasonable opportunity to recover actual costs incurred in future regulatory periods – unless there are sufficient 'offsets' in the ORC approach from the gains in replacement cost valuations.

These concerns about cost over-recovery are most relevant for assets which have been in place for a long time, and which have increasing asset values. Further, where there is little chance of the assets being replicated by a hypothetical efficient entrant, the notion that the value attached to these assets must reflect full replacement costs (to promote efficient 'build or buy') has little force.

These considerations are particularly pertinent to the modelling and trench and duct asset costs, which meet all of these criteria. On this basis, we consider that the Commission should use an ODRC valuation (also known as DORC) approach to establish the initial value of these assets.

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25 The ACCC has argued that: "The opening RAB in these (electricity and gas) industries was set based on a forward looking approach to asset valuation — DORC and additions to the asset base are valued at actual cost, which as noted, at the point in time at which it is added, is the same as optimized replacement cost." (ACCC, 2009, p. 56)

We note that some further issues with the use of an approach which accounts for the economic life of the current assets are likely to arise. The first is that the accumulated depreciation of the assets must be estimated. This exercise, while challenging for a short lived asset subject to technological change, is not so difficult for a long lived asset that is not subject to technological change.

There are different ways to obtain a DORC valuation. One approach to obtain a DORC valuation would be to the following:

- First assessing the total expected life of an asset.
- Next, assess the expected remaining life of the asset. This could be done using information obtained either from Chorus' financial records, or through an independent engineering study of the state of existing assets.
- Then, take the ratio between the expected remaining life of the asset and the expected total life of the asset.
- Finally, multiply the ORC valuation by the ratio obtained in the previous step.

A very similar approach to establishing DORC values in bottom up models has been employed in Australia, for instance.

An alternative approach was proposed in the European Commission's recommendations to NRAs. Essentially, this is a Depreciated Replacement Cost approach, which involves indexing forward the historic cost of assets, and then subtracting from this value accumulated depreciation.

By rolling in the new capital expenditure on a replacement cost basis (and if these assets are not revalued in subsequent periods), the access provider would in expectations recover its efficient investment costs.

Indeed, the European Commission essentially recommends the use of DORC and a lock in and roll forward for reusable legacy civil engineering assets:

> [35] In the recommended costing methodology the Regulatory Asset Base (RAB) corresponding to the reusable legacy civil engineering assets is valued as current costs, **taking account of the assets' elapsed economic life and thus of the costs already recovered by the regulated SMP operator**…The initial RAB would then be locked in and rolled forward (European Commission, 2013, p. 8). [emphasis added]

4.1.2 Valuation of loop assets

MEA is fibre

If a (mostly) fibre MEA is chosen, then it would be logical to value the network assets at the replacement costs of installing these assets in the optimised network (e.g. the laying of fibres in the case of an all-fibre network). That is because these costs have never been incurred, and so arguments to value them on any other basis have less relevance. In turn, this valuation approach has implications for the form of depreciation used.

If the Commission were to take the view that the most appropriate approach is to re-optimise the network completely, on the basis of the most efficient technology available, it should not necessarily assume that the entire network should be built with fibre. It may be more efficient to serve certain regions (e.g. rural parts of the country) using fixed wireless technology.

MEA is copper and fibre

If the MEA is determined to be a mix of copper and fibre, how should these assets be valued? As for other existing assets, these assets could be valued using, but with an adjustment for their remaining economic life (accumulated depreciation) to reflect existing cost recovery. As for the duct network, valuing the assets on this basis will facilitate positive outcomes related to protection against over-compensation.

That said, a significant modelling issue with such a valuation approach would be how to reconcile this with the falling demand for these services over time, as Chorus proceeds to roll out more fibre. Unlike the duct network, which will be shared between CGA and NGA, the economic life of the copper and fibre assets now in existence will be not be long. An approach to solving this issue is to explicitly model the transition between the copper and fibre networks. The shortening of economic lives and the loss of copper lines over time can be explicitly factored in to the cost recovery profile (front loading the depreciation), which will also have the effect of providing for a relatively smooth price profile to fibre services (which, to be consistent with principles of economic depreciation, will likely have a back loaded depreciation profile).

The alternative approach which avoids these issues is to simply use the ORC valuation, but to pair this with an assumption of constant demand across the (longer) life of the assets, and an annuity or tilted annuity approach to depreciation. This would provide for a smoother price path that reflects the anchoring kind of approach described in section 3. We recommend it on this basis.

4.2 Asset revaluations should be minimised

4.2.1 Re-used assets should not be re-valued over time

As noted above, moving to an approach that values the assets net of accumulated depreciation would allow for future capital expenditure to be rolled into the asset base for future recovery. We would expect that, as these copper assets enter a transition phase, there will be a decline in the new expenditures on these networks as more resources will be put towards a fibre roll-out. It would be more efficient to recognise directly this changing pattern of investment to lock these values into the model, and, as the European Commission suggests (in relation to non-replicable assets) "...[ensures] adequate remuneration...and at the same time provide regulatory certainty for the both the SMP operator and access seekers over time." (European Commission, 2013, para 38).

4.2.2 For loop assets, limit revaluations for as long as feasible

In follows from our principles in section 2 that the Commission should try to minimise the extent of ongoing revaluation and optimisation of the network. Although frequent resets of the costing methodology may better ensure that costs are more 'forward looking', frequent resets have undesirable effects in situations where optimisation and revaluation gains were largely unforeseen. In such instances, windfall gains or windfall losses will be experienced.

We suggest that, at a minimum, the Commission should try and lock in the costing method and UCLL price for a period of 5 years. This would allow for a reasonable period of certainty. This recommendation applies regardless of the MEA approach.

4.3 Depreciation

There are a number of different depreciation approaches that could be adopted, and the Commission has identified the key ones:[26]

- Economic depreciation;
- Straight line; and
- Annuity (standard or tilted)

The choice of depreciation approach should depend on practical considerations as well as on the overall approach to TSLRIC modelling adopted.

4.3.1 Role of depreciation in TSLRIC models

The Issues Paper implies that depreciation in the value of capital assets, due to utilisation over time, is a cost that needs to be recovered through the access price. This is partially correct in the case of access network assets where, to date, the limiting factor on asset lives has been physical degradation (for example of duct and copper cable), rather than technological obsolescence. However for many telecommunications assets, the value and useful working lives of assets are determined by technological progress rather than physical deterioration

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26 A further approach, which the Commission has not discussed is 'renewals accounting' where the depreciation charge for a network of indivisible assets (e.g. the duct network) is set to reflect the investment required to maintain the network at a constant level of quality.

More generally, from an economic regulatory perspective, depreciation is included in the calculation of allowable revenues as a means of returning to investors the value of the capital assets over the economic lifetime of the assets. The depreciation component of TSLRIC model represents the return of capital. The product of the WACC and the asset base represents the return on capital. Together, the return on and of capital represent the total return to investors in the network.

The depreciation methodology determines the time profile of the return of capital to investors. However, in general, regardless of the depreciation approach used, regulators aim to provide investors with an expectation of recovery of the cost (including opportunity cost) of the initial investment.[27]

4.3.2 The main approaches to depreciation possible

Economic depreciation

An economic depreciation approach attempts to match the profile of allowable revenues over the lifetime of the asset to one or more drivers, typically changes to the value of equipment and changes in the demand served (utilisation) of the asset over time. This approach is most suitable when the asset base in question is revalued periodically (e.g. to reflect changing asset values, obsolescence and greater efficiency of alternative technologies).

In general, an economic depreciation approach:

- is complex to implement in practice as it requires detailed forecasts of demand and other factors that may drive asset values over long horizons (i.e. the whole network life cycle).
- Can be very subjective, particularly given the long horizon over which forecasts must be made, and the scope for technological change in this industry.
- May result in a volatile pattern of access prices over time (depending on the extent to which new information, e.g. on changes in asset prices or demand, is taken into account over time). This could increase the perceived risks of the investment and, therefore, the returns required by investors. These risks could be avoided by employing an alternative approach that produces a more stable pattern of returns to investors over time.

For the reasons outlined above, the Commission is correct to not favour economic depreciation as a methodology for determining the return of capital to investors.

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27 Specifically, regulators aim to set the net present value of the allowed revenues over the lifetime of the assets equal to the net present value of the initial investment in those assets.

Straight line depreciation

The straight line depreciation approach is often used for top-down models as they reflect the methodologies used in statutory accounts. The straight line approach could also be used in bottom-up models. However, the approach has two key drawbacks:

- Under straight line depreciation, the change in asset value is constant over the defined asset life. However, as the asset value is declining linearly over time, the total return to investors also falls linearly over time (all else remaining equal). This results in front-loading of allowable revenues over an asset's lifetime. This would be more consistent with an assumption that utilisation of the asset is falling over time than an assumption of relatively stable demand.
- Straight line depreciation can lead to sharp price hikes at regulatory resets if the assumptions about when assets are acquired are also varied. This would be especially problematic if the UCLL network were to be re-optimised periodically.

Annuities

An annuity approach sets directly the profile of allowable revenues to be either constant over time (standard annuity), or to vary at a constant rate (tilted annuity).

A tilted annuity approach sets the rate of change in allowable revenues so that it reflects the rate of change in the replacement costs of assets. In general, as the cost of most access assets have a low technological content and a high installation cost (e.g. ducts, trenches etc) unit costs increase over time, and the tilt tends to lead to access prices increasing in nominal terms over time. However, in instances where assets prices are expected to decline over time (e.g. due to falling demand or through technical obsolescence), the tilt leads to a front-loading of allowed revenues and, therefore, falling access prices.

The tilted annuity approach can suffer from a degree of subjectivity since judgments need to be made about the future path of asset prices. In order to establish the annuity 'tilt', it is necessary to decide not only whether prices are likely to increase or fall, but also the rate at which prices are expected to change. This could be difficult to do reliably. Regulators in Europe have tended to favour the use of a general inflation forecasts (e.g. CPI) to establish the tilt on the basis that it such forecasts are less subjective, and because judgments about the future path of asset prices such as copper can be avoided. However, CPI inflation can diverge significantly from input price inflation.

A standard annuity approach:

- is fairly simple (as it avoids the subjective judgments that need to be made when using a tilted annuity approach) and transparent to implement;
- results in a stable profile of regulated revenues over time; and
- is consistent with the assumption of a copper network in steady state (i.e. with no periodic re-optimisation over time, and with an assumed level of demand that is relatively stable over time).

4.3.3 A tilted annuities approach should be used for depreciation

We do not recommend the use of economic depreciation (due to the complexities involved in implementing the approach) or straight line depreciation (given the tendency to front load allowed revenues). Therefore, we suggest that the Commission pursue an annuity approach to depreciation.

The Commission notes in its Issues paper that a tilted annuity approach is desirable because of its flexibility. The tilted annuity approach can accommodate expectations about falling, rising or flat asset prices; if asset prices are expected to remain constant over time, the tilted annuity approach would collapse to a standard annuity. We consider that this is correct, and support the Commission's proposal to employ a tilted annuity approach. In addition, a tilted annuity approach is most consistent with use of full ORC valuations of assets, for which no reliable information exists on the vintage of different assets within the asset base.

In doing so, the Commission should consider the expected path of prices for the various types of assets in the asset base. For instance, the Commission should take account that the cost of trenches and ducts, which would comprise the bulk of the assets in the asset base, is likely to be increasing over time (e.g. due to rising labour costs). For the copper/fibre component of the asset base, asset prices may be falling over time, in which case the Commission should reflect that in the tilts applied to depreciate those assets.

We recommend that a tilted annuity approach be used regardless of whether the Commission locks in and rolls forward the asset base, or undertakes periodic ORC revaluations of the asset base.

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