Final report for Vodafone

A review of key benchmarking issues in UBA submissions

Cross-submission for the Unbundled Bitstream Access Draft Determination

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NETWORK STRATEGIES • Telecommunications Strategy •

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NETWORK STRATEGIES

1 Introduction

The Commerce Commission is required under the Telecommunications Amendment Act 2011 to determine a benchmarked forward-looking cost-based price for Unbundled Bitstream Access (UBA) services to apply from 1 December 2014. This replaces the retail-minus approach applied previously as the initial pricing principle (IPP) for UBA services. Accordingly the Commission has issued a draft determination[1] with its preliminary views on appropriate pricing for the UBA services.

Vodafone Fixed Limited (Vodafone) has commissioned Network Strategies to examine new issues raised in the submissions to the draft determination. This report encompasses:

- the suitability of additional data to expand the benchmark set (Section 2)
- discussion of various proposed adjustments to the benchmark analysis (Section 3)
- selection of a price point (Section 4)
- the applicability of a UFB pricing constraint (Section 5)
- concluding remarks (Section 6).

Although Vodafone commissioned this report, the views expressed here are entirely those of Network Strategies.

1 Commerce Commission (2012), *Unbundled Bitstream Access Service Price Review*, 3 December 2012.

2 Expanding the benchmark set

A number of the submissions suggest that additional countries be included in the Commission's benchmark sample. Below we consider the cases presented for inclusion, together with the practicalities. We also consider issues in benchmarking the EUBA service.

2.1 Belgium

Chorus (CEG) and Telecom (Analysys Mason) both submit that the benchmark data set should be expanded to include data from Belgium. CEG recommends including Belgian prices with a mark-up of 83.3%, although states 'we have not reviewed the [Belgian] UBA price or model'[2]. Analysys Mason argues that the Belgian network is sufficiently similar to be included in the data set without any adjustment.

Network Strategies does not agree with the Analysys Mason 'close enough'[3] assessment as the unadjusted costing data does not reflect the network set up in New Zealand. The Belgium model calculates prices at level 1 and 3 handover points. For a price that is reflective of cost it is therefore unreasonable to include prices in the data set unadjusted for transport costs.

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2 CEG (2013) *Wholesale broadband cost drivers,* January 2013, page 42.

3 We note that Analysys Mason undertook the cost modeling work on the Belgium access services, so may have access to information not publicly available.

The Belgian BROBA product is provided over a network in which the First Data Switch (FDS) is co-located with the DSLAM. To make this service comparable with the New Zealand UBA service (where the network topology consists of 84% of the FDS physically separated from the DSLAM) an adjustment would need to be made to account for the transport costs between the DSLAM and the FDS. Any adjustment would also need to account for the difference in costs due to network topology (for example, more/fewer DSLAMs, more/fewer FDS). After reviewing the publicly available information on the Belgian cost model it becomes apparent that the model does not contain enough information to establish a transparent, verifiable and reasonable method of establishing these transport costs for the purposes of adjusting the end prices. The released model is neither complete, due to the removal of confidential operator information, nor final, as only the draft version of the model is publicly available. Therefore any analysis and adjustment made on the basis of data sourced from this model would introduce more price uncertainty than would be gained by the addition of a single point to the data set.

Furthermore, it would be inappropriate to include Belgium within a ratio benchmarking analysis for exactly the same reason, namely that the network topology differs markedly from that in New Zealand. The ratio benchmarking approach (discussed further in Section 3.5) assumes that there is a relationship between UCLL and UBA costs. If this assumption is valid, then in the case of Belgium the bitstream uplift in cost from UCLL would be influenced by those differences in network topology, and would thus be inappropriate to use for New Zealand.

2.2 Switzerland

The Chorus (CEG) submission contained the only recommendation for the inclusion of Switzerland to the data set. CEG recommends including Swiss prices with a mark-up of 61.1%, although it admits 'we have not reviewed the [Swiss] UBA price or model'[4]. Its only basis for this adjustment is its suggested normalisation process to allow for spatial density. CEG does not calculate an econometric adjustment for Switzerland. We do not believe that CEG's ratio benchmarking approach is valid, as discussed in Section 3.5.

4 CEG (2013) *Wholesale broadband cost drivers,* January 2013, page 42.

Furthermore, the Swiss model has not been verified by the regulator as the service is subject to *ex post* regulation, and as such is only reviewed following a request from affected parties. We understand that this has not occurred to date. Network Strategies does not recommend the inclusion of data from this model for that reason, although if the Commission decides the lack of formal scrutiny is not an issue in this instance and that the model is robust enough, at face value it appears that the data should be included unadjusted as it is modelling a similar service to that offered in New Zealand. Nevertheless we note that the model is not publicly available.

Chorus endorses the WIK suggestion that the inclusion of Switzerland and Belgium would result in overestimation (in the case of Belgium) and underestimation (for Switzerland) and therefore it would be acceptable to include both since the two effects might cancel each other out[5]. This is pure speculation, and in the absence of both cost models the Commission is unable to make a reasonable assessment of the required adjustments to produce results based on services that are truly similar to the New Zealand service.

2.3 Greece

The Chorus (CEG) submission contained the only recommendation for the inclusion of Greece to the data set. CEG recommends including Greek prices with a mark-up of -12.2%, although it admits 'we have not reviewed the [Greek] UBA price or model'[6]. Its only basis for this adjustment is to include a ratio adjustment with UCLL prices for line density. We do not believe that this ratio benchmarking approach is valid, as discussed in Section 3.5.

The Greek model has not been verified by any regulatory authority, and does not appear to meet the Commission's criterion of an efficient, forward-looking cost model.[7] The Commission may choose to relax its evaluation criteria for benchmark countries, in which

5 Chorus (2013) *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013. See paragraphs 79 to 80.

6 CEG (2013) *Wholesale broadband cost drivers,* January 2013, page 42.

7 Commerce Commission New Zealand (2012) *Unbundled Bitstream Access Service Price Review*, 3 December 2012, page 43.

case the data from this model must be adjusted for transport costs as the handover points used in the model are not at the same level as those in the New Zealand network. Unfortunately there is no publicly available Greek model. Therefore, without firm information regarding the transport costs these adjustments cannot be applied.

2.4 Hungary

Telecom (Analysys Mason) submits[8] that Hungarian data, adjusted to include transport costs, should be used as an addition to the benchmark set or as a cross check of the final price. Its argument is that the inclusion of Hungary in the data set increases the robustness of the benchmark price and does not materially affect its price.

Network Strategies does not agree with this line of reasoning: either the network is close enough to the New Zealand network to be included in the data set with the inclusion of transport costs or it is not close enough and should not be included. The fact that the price is similar to the other benchmark countries does not mean that the network is similar to the New Zealand network nor that the costing methodology used in the model is acceptable to the Commission.

2.5 Other countries

The Enable-Whangarei-Ultrafast submission argues[9] that France, Spain, Bahrain and the United Kingdom should also be included in the benchmark data set. It states that the Fully Distributed Cost (FDC) methodology used in these models is consistent with a forward-looking cost-based pricing method and therefore meets the Commission's criteria for inclusion. It cites arguments that the FDC methodology is not proven to be an inferior method to TSLRIC.

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8 Analysys Mason (2013) *Comments on UBA service benchmarking review*, 30 January 2013, page 7.

9 Emable Networks Ltd, Whangarei Local Fibre Company Ltd and Ultrafast Fibre Ltd (2013) *Joint submission on unbundled bitstream access service price review draft determination dated 3 December 2012*, 1 February 2013, page 11.

Network Strategies submits that the robustness of the benchmark data set is not improved by including data derived from models using fundamentally different methodologies. The argument as to the merits of TSLRIC versus FDC models is a distraction from the primary concern, which should be the consistency and verifiability of the benchmark price.

2.6 EUBA benchmarking

The Swedish PRO service is theoretically a suitable service to use as an EUBA benchmark. Unfortunately, the derivation of its price in the Swedish model is not clear. Network Strategies concurs with the Analysys Mason analysis that 'enhanced product pricing base on the supposed price differences for different variants of the Swedish Bitstream Pro [*sic*] service is not sustainable as a benchmarking method…'[10]. It is not at all certain from examination of the model how the pricing values were calculated. The only distinct difference between the naked ADSL product and the PRO service in the model is that the PRO service assumes greater core demand per subscriber. There must be other differences, such as hardware (line cards) and software (service and provisioning) , however there is no evidence of these in the publicly available model.

Network Strategies submits that prices should be calculated using a mark-up approach. The EUBA service is an enhanced service to the basic UBA and as such a simple proportion increase to the basic service costs should be relatively straightforward to estimate from the existing Swedish model. This is a more reasonable approach than benchmarking the EUBA service to a wider (but not comparable) benchmark set.[11]

10 Analysys Mason (2013) *Comments on UBA service benchmarking review*, 30 January 2013, page 8.

11 We believe that in this case, the proportional mark-up approach is appropriate. There are a number of network elements that are common to both the EUBA service and the basic UBA, and so there is clear evidence of a relationship between basic UBA costs and EUBA costs. We emphasise that this is a very different situation to that of the UCLL and UBA services, which is discussed further in Section 3.5.

3 Proposed adjustments to the benchmark analysis

3.1 Selection of time period

In our earlier report[12], we noted that it is important to use price data that applies to the same period of time, rather than for differing years. The Commission's analysis in the draft determination used 2011 data for Sweden, and 2012 prices for Denmark (the latter were subsequently revised by the Danish regulator). This mismatch of time periods may incorporate potentially conflicting assumptions for various inputs used to derive forward-looking costs.

We stated that both 2012 and 2013 data was available for Sweden. In its submission, Chorus noted that 2013 data was also available for Denmark. Chorus' consultant, CEG, presents the Danish and Swedish 2013 prices by bandwidth[13].

CEG's list of Danish prices incorporates those prices released by the regulator[14], together with the subsequent correction issued[15]. However there are two errors in the table. One service is listed by CEG as having bandwidth of 4086kbit/s – this should be 4096kbit/s.

12 Network Strategies (2013) *Benchmarking issues in the Unbundled Bitstream Access Draft Determination*, report no 32023, 30 January 2013.

13 CEG (2013) *Wholesale broadband cost drivers*, January 2013, Table 6-1.

14 Erhvervsstyrelsen (2012) *Afgørelse om fastsættelse af maksimale netadgangspriser efter LRAICmetoden for 2013 – fastnet*, 7 December 2012.

15 Erhvervsstyrelsen (2012) *Korrektion af visse maksimale netadgangspriser fastsat i Erhvervsstyrelsens LRAIC-afgørelse (fastnet) af 7. december 2012*, 12 December 2012.

Secondly, the price of the 20 480kbit/s service is given as DKK946 – the original source lists this as DKK947.

We have checked CEG's list of Swedish prices, and it agrees with the most recent prices issued by the regulator[16].

Ultimately, it remains the Commission's decision as to which time period be used for the benchmarking. However, the most recent data available is likely to best represent forward-looking cost-based prices, providing that all prices in the benchmark set apply to the same time period.

We would therefore recommend that if all countries within the benchmark sample have 2013 prices available, then those should be used.

3.2 Services by bandwidth

Deriving prices by bandwidth

Several submissions pointed out that in deriving bitstream prices by bandwidth, both the Danish and Swedish regulators estimate an average cost-based price (over all speeds), and then apply a logarithmic model to this average price to allocate costs such that the resultant prices are scaled by bandwidth.

In its reproduction of the distribution of prices by bandwidth for Sweden and Denmark, CEG includes an "allocation gradient" for which is noted:

> In effect, by adopting an allocation gradient, the regulators ensure that low and high usage intensive products do not end up having the same price. In particular, the allocation

16 PTS (2012) *Kostnadsresultat för LRIC hybridmodell för det fasta nätet v.9.1*, 14 December 2012.

gradient results in usage intensive services bearing a higher proportion of the common costs.[17]

Furthermore the allocation gradient shown in CEG's table is purely the logarithmic curve (that is, representing the relationship between the service bandwidth and the base bandwidth), and does not include the weighting by demand.

This claim misrepresents the methodology used in Denmark and Sweden. In fact, the cost allocation is driven by the *combination* of three factors:

- the collection of bitstream bandwidths offered
- the relationship between each of the bandwidths and a nominated base bandwidth
- the distribution of demand across the various bandwidths.

These three factors are clearly market-specific.

As an illustration, in Denmark the cost allocation to the 15 360kbit/s service is lower than that of the 10 240kbit/s service, as the effect of the lower level of demand for the former is greater than the effect of the higher bandwidth.

It should be noted that this allocation methodology does not represent an actual relationship of the relative costs of the various bandwidth services – it is purely an assumption, representing a notional relationship between costs and bandwidth. This relationship is defined such that costs will be recovered: for each bandwidth offered in that country, demand by bandwidth is multiplied by the price by bandwidth, and then summed over all bandwidths to obtain total costs for the bitstream service.

As CEG points out, the Commission's use of the price for the lowest bandwidth service would not achieve cost recovery.

We recommend that the weighted average price be used, as this will be independent of the distribution of services by bandwidth.

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17 CEG (2013) *Wholesale broadband cost drivers*, January 2013, paragraph 172.

Distribution of services by bandwidth

When considering services by bandwidth, there is a key difference between New Zealand and the benchmark countries of Denmark and Sweden.

In both Denmark and Sweden, bitstream service offerings encompass a broad range of bandwidths. Access seekers may therefore offer retail customers several different bandwidth services, priced accordingly. By contrast in New Zealand, retail services are differentiated by the data caps – there is no differentiation by the service bandwidth.

It should also be noted that even though a retail customer may subscribe to a low bandwidth service, the actual speeds achieved may be somewhat greater. Operators do not always shape the speed of these low bandwidth services.

Furthermore, with some New Zealand retail plans the speed is throttled (to dial-up speed) once the user reaches the plan's data cap. In Denmark and Sweden data caps are generally not applied and so speeds are never throttled. Data throughput on Chorus' network would therefore be driven by a mix of throttled and unthrottled services, rather than being driven solely by the theoretical maximum speeds.

Chorus' graph of the ADSL line speed distribution[18] therefore misrepresents the situation in all three countries. It is important to note that the Danish and Swedish distributions reflect retail demand for the various bandwidth services, whereas the Chorus distribution represents the theoretical (unthrottled) line speed of its DSL services. The graph therefore compares two very different parameters. We cannot comment on the theoretical maximum speeds in Denmark and Sweden, as that information is not provided in the models – only the distribution of the retailed speeds.

We conclude that the situation with regard to line speeds is somewhat more complex than Chorus describes. An adjustment based simply on the theoretical maximum line speed in New Zealand is very likely to over-compensate for any alleged differences in bandwidth

18 Chorus (2013) *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013, paragraph 73.

distribution. In the absence of firm supporting evidence from all three countries we therefore recommend that no such adjustment be made.

3.3 Alleged problem with the Danish price

Chorus suggested that an adjustment be made to the Danish price, as the Commission mistakenly included a shared loop component in deriving the benchmark estimate.[19] Chorus identified this alleged error from inspection of the Danish regulator's response to the Commission's questionnaire.

Our earlier comments on the derivation of the Danish price used by the Commission were made without the additional clarification of the regulator's responses to the Commission's questionnaire, which was provided to us for the cross-submission. Hence our comments below supersede those of our earlier report[20].

The Commission, in its spreadsheet calculations, added the price for the shared loop (tillæg drift pr. år for BSA uden samproduktion) to the regulated price for bitstream (BSA – adgang ved Lag 2 switch), then subsequently subtracted the shared loop price.

However, in its questionnaire response when asked to state the full local loop tariff if it is included in the WBA tariff, the Danish regulator wrote that:

> Only half loop included. The price of WBA without co-production costs a shared raw copper more (full loop = 68,3 kr per month, shared loop = 34,15)[21]

Furthermore:

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19 Chorus (2013) *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013.

20 Network Strategies (2013) *Benchmarking issues in the Unbundled Bitstream Access Draft Determination*, report no 32023, 30 January 2013.

21 Commerce Commission (2012) *Wholesale bitstream access questionnaire raw data.*

> WBA without coproduction is based on a full loop in the LRAIC modelling,… Likewise WBA with coproduction is based on a shared loop.[22]

This therefore suggests that the Commission's calculations did not remove the loop price from the price it used for Denmark. It should be noted that the Commission stated that in regard to the questionnaire raw data:

> …further information was collected by internal Commission research, ongoing correspondence with NRAs, and advice from WIK Consult.[23]

Network Strategies' reading of the Danish model is that the shared loop price should be subtracted from the final price, and the coproduction costs should be added to it (to account for the costs that are constant across all bandwidths). Note that the annual coproduction costs are the same as the annual shared loop costs (Exhibit 3.1).

	Original prices for 2012 (DKK)	*Revised prices for 2012 (DKK)*	*Prices for 2013 (DKK)*
Shared LLU	410	398	372
Tillæg drift pr. år for BSA uden samproduktion (annual rental without co-production	410	398	372

Exhibit 3.1: *Annual rental, Denmark [Source: Erhvervsstyrelsen]*

We therefore seek clarification from the Commission as to whether any additional information was obtained regarding the Danish price to support its calculations.

22 *Ibid.*

23 *Ibid.*

3.4 Impact of line density

In its submission, Chorus[24] suggests that the benchmark estimates be adjusted for spatial density, claiming that without such an adjustment the estimates would underestimate the cost of UBA in New Zealand. The rationale provided for this claim is that New Zealand population density is much lower than in the benchmarked countries, and thus costs should be higher. This claim is supported by an econometric analysis by CEG[25] which purports to demonstrate that spatial density factors are important cost drivers.

CEG disputes the Commission's assumption that spatial density factors are unlikely to be important drivers of bitstream costs. The Commission stated:

> The UBA service is largely comprised of active network infrastructure. For instance, DSLAMs are major cost components of UBA networks. Accordingly, spatial density factors are less likely to be major cost drivers of UBA networks.[26]

CEG agrees that DSLAMs are major cost components for UBA, but claims that as DSLAM costs are largely fixed, the average cost in less densely-populated locations is higher than in urban areas, and with a number of DSLAM sites having relatively few lines, New Zealand would be more expensive than the benchmark countries. Furthermore CEG claims that the less densely populated New Zealand would have longer trenches from the DSLAM to the handover point, and thus costs would be higher.

While CEG establishes relationships between various factors, these relationships only demonstrate that line density could be a potential proxy for the cost drivers. If the actual cost drivers in the benchmark sample – that is, number of lines by DSLAM site and trench length from the DSLAM to the handover point – were compared with those in New Zealand we would have firm evidence of whether or not costs in New Zealand would be higher than in the benchmark countries.

24 Chorus (2013) *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013.

25 CEG (2013) *Wholesale broadband cost drivers*, January 2013.

26 Commerce Commission (2012), *Unbundled Bitstream Access Service Price Review*, 3 December 2012, paragraph 71.

So the key questions to establish whether average costs may be higher (or lower) in New Zealand are:

- whether the mix (that is, the distribution) of DSLAM sites by number of DSL lines in New Zealand differs from that the benchmark countries
- whether the mix (the distribution) of trench length from the DSLAM to the handover point in New Zealand differs from the benchmark countries.

We therefore need to establish whether the mix of high- and low-cost sites differs – if New Zealand has a greater proportion of high-cost sites and/or a lower proportion of low-cost sites, then we may be able to conclude that the average cost in New Zealand would be higher.

We are fortunate in that this information is available for the benchmark countries – Denmark and Sweden. This may not be the case with other potential candidates for the benchmark set.

Nonetheless given the extensive Chorus data supplied to CEG and the availability of this information from the Danish and Swedish models (and also used by CEG), it is surprising that CEG did not compare these factors to conclusively demonstrate its claim.

Although we do not have the Chorus data used by CEG, the summarised information and graphs provided in the CEG report enables a fairly broad comparison to be achieved.

In addition, we note that the relationship between costs and line density in the benchmark countries versus New Zealand is more complex than the CEG submission indicates. There is a distance-from-DSLAM / data-throughput trade-off as well as a data-throughput / line-density trade-off. The relationship between costs and line density is not so simple as to be able to assert that the greater the line density the lower the costs:

- the lower the line density the greater the data throughput – a greater data throughput means that the core network costs will also be greater.
- the further the DSLAM from the end customer the lower the data throughput – thus lowering the costs in the core network.

Significantly more data is required in order to be able to determine the relationship between costs and line density in the benchmark countries versus New Zealand (almost certainly more data than was available to CEG). The goal of this exercise is not to model the costs of the New Zealand network directly. The current exercise is to benchmark the price in New Zealand to services that are similar, not to adjust the benchmark prices to exactly match the New Zealand fixed copper network.

Bitstream cost drivers in Denmark

As in any financial model, the cost of a DSLAM location is determined by capital expenditure (capex) and operational expenditure (opex). The DSLAM/MSAN capex comprises MDF[27], chassis and line cards, and it is clear from the model that these costs are not fixed but are driven by demand.

MDF	There are five types of MDF used in the Danish model, with the MDF type being specified for each node in the network. These have capacities varying from 250 to 50 000 lines with presumably the smaller capacity MDFs being installed at nodes with lower demand. Costs for the various types do vary, however there are some economies of scale.
Chassis	The Danish model includes two types of chassis, distinguished by their capacity in terms of line cards (four and sixteen respectively). There are two cost drivers for the chassis – subscribers and traffic. The chassis type is specified for every node in the network, with the smaller capacity (and less expensive) chassis presumably being installed at nodes with lower demand.
Line card	The driver for the number of line cards is the number of end services, with the capacity of each line card being 48 lines.

27 The Danish model includes MDF within the DSLAM/MSAN.

In the Danish model each of the individual DSLAM components (not the DSLAM location) has an associated annual opex. Furthermore, various common costs are also allocated to the DSLAM components (not the DSLAM location) according to a routing table. Hence opex is driven by the quantity and types of equipment installed at the DSLAM site, which in turn is driven by demand.

So it is clear that in the Danish model, the cost of DSLAM locations scales according to the number of lines and also the traffic – it is definitely not “largely fixed” as claimed by CEG. It is also clear that less densely populated DSLAM locations are dimensioned accordingly, in order that excess capacity is not installed.

CEG’s analysis of Danish DSLAM sites is therefore of limited use as it appears to discount the fact that the cost per DSLAM site is dimensioned by the number of lines and the traffic at that site. While there may be some effect due to economies of scale, CEG’s suggestion that there are “potentially very high unit costs in areas with lower scale and low unit costs” is nonetheless grossly overstated.

If, on the other hand, DSLAM costs in New Zealand are “largely fixed” this suggests a level of inefficiency that would be inappropriate to replicate within forward-looking cost-based prices.

While we do not consider the economies of scale factor to be as dramatic as CEG implies, we subsequently examined whether the number of DSL lines per node in Denmark[28] was markedly different to that of New Zealand. If the distributions prove to be similar, then there are no grounds for a line density adjustment to the benchmark on the basis of DSLAM costs. It is important to note that in determining a benchmark estimate we are focused on deriving a geographically averaged price, and thus need to consider the costs across all area types, both urban and rural, and how they may affect the overall average.

While we do not have access to the original Chorus data that was used by CEG, we can make a number of key deductions from the information provided in CEG’s report.

28 Sourced from the Danish cost model used to derive 2013 prices.

Estimates derived by inspection of CEG's graphs have some associated uncertainty, in particular as it is not possible to identify datapoints that are superimposed.

CEG's analysis[29] finds that in New Zealand:

- the number of customers at DSL locations in cabinets is predominantly between 100 and 500
- the number of customers at exchange sites is often in the thousands – from the graph provided by CEG this appears to apply to around 25% of exchange sites
- there are no cabinet sites with more than 1000 DSL lines.

In its analysis of Danish locations, CEG uses information from the edge routers, for which it claims that there are 108. Note that there are far fewer edge routers than DSLAM/MSANs, and that the site total used by CEG appears to be the sum of the edge and distribution routers (Exhibit 3.2).

	Number of sites in cost model
DSLAMs/MSANs	1730
Edge routers	95
Distribution or core routers	13
Total	1838

Exhibit 3.2: *Site numbers, Denmark [Source: Erhvervsstyrelsen]*

It is clear from the Danish model that there are multiple DSLAM sites per edge router area, and hence the distribution of lines per DSLAM site is a very different issue to the distribution of lines per edge router. For each edge router there are associated direct and indirect lines – the latter are associated with a DSLAM/MSAN connected to the edge router.

In its analysis, CEG claims that 14% of areas have more than 2000 DSL lines per DSLAM site. This misrepresents the distribution of lines per DSLAM site in Denmark – in fact this figure should be described as 14% of edge router areas have on average more than 2000

29 CEG (2013) *Wholesale broadband cost drivers*, January 2013.

DSL lines per DSLAM site. CEG appears to have obtained this figure by dividing the total number of DSL lines (direct and indirect) associated with the edge router by the number of DSLAM/MSAN sites connected to that edge router. This gives the average number of DSL lines per DSLAM site across all sites that are connected to that edge router.

Essentially, CEGs's analysis aggregates DSLAM sites in Denmark to the edge router level. Furthermore only the average DSLAM lines per site for each edge router is used. This means that significant information relevant for estimating costs of small DSLAM sites is omitted. This gross over-simplification of the distribution of sites in Denmark has potentially a substantial effect on the econometric analysis that uses this aggregated data.

Exhibit 3.3 illustrates the different approaches. The actual network has multiple edge routers, to which are connected multiple DSLAMs. So a generic edge router n will have m_n DSLAMs, plus there may also be lines connected directly to the edge router, rather than to a DSLAM. From these DSLAMs we can establish a distribution to establish how many DSLAMs fall into each of the categories denoting size (or number of DSL lines). As noted in Exhibit 3.2 there are 1730 DSLAM sites.

In contrast, CEG determines the size of the average DSLAM connected to each edge router, and establishes a distribution based on these average DSLAMs. Note that there are just 95 edge routers plus 13 distribution or core routers.

What we find is that the two distributions – that is, of DSLAMs and of CEG's constructed average DSLAMs – are very different, and this difference leads to erroneous conclusions regarding the size of DSLAMs in Denmark.

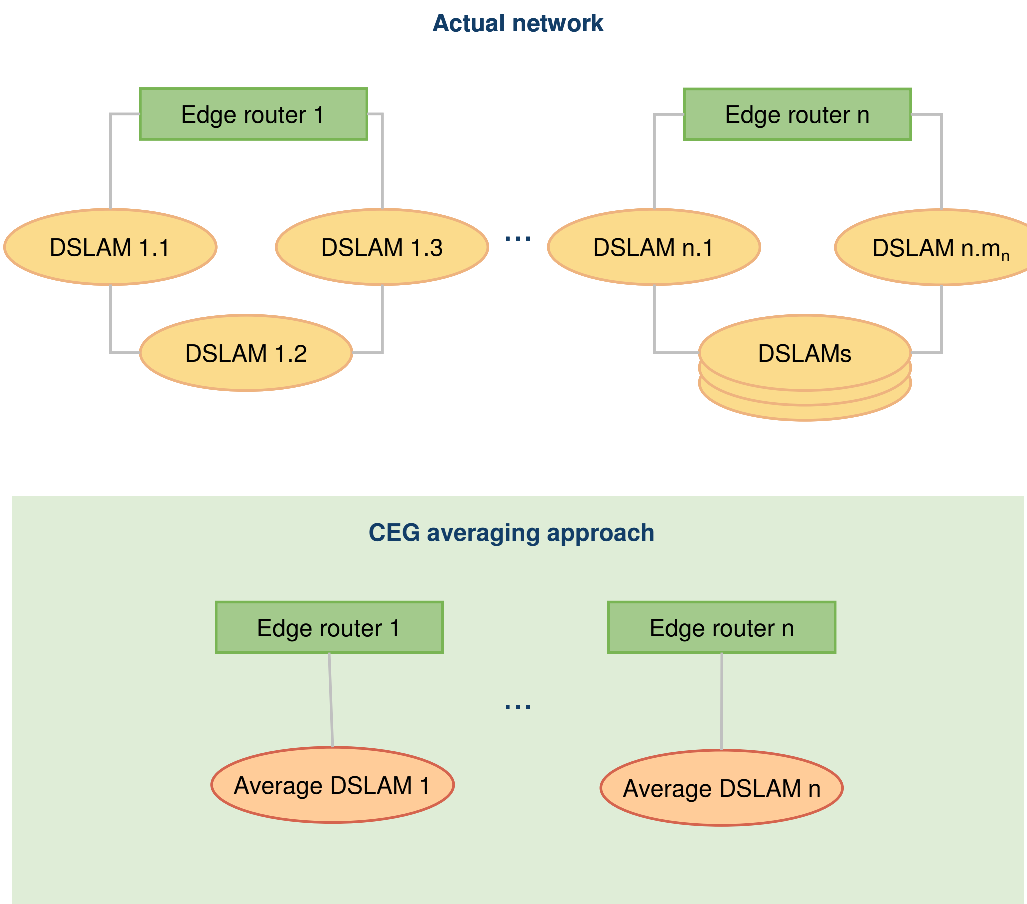

Exhibit 3.3: *Comparison of the two approaches for analysing lines per DSLAM [Source: Network Strategies]*

If we examine direct DSL lines per DSLAM site in Denmark – rather than the average lines per DSLAM site within the edge router – we find that:

- the average DSLAM site has 415 DSL lines
- 29% of DSLAM sites have less than 100 DSL lines
- half of all DSLAM sites have 100–500 DSL lines
- 5% of DSLAM sites have between 1000 and 2000 DSL lines
- less than 4% of DSLAM sites have more than 2000 DSL lines.

The differences between the two sets of figures – that is, comparing the distributions for the Danish DSLAM sites, and for the averages calculated by CEG – are quite marked

(Exhibit 3.4). The actual data from the Danish cost models shows that nearly 80% of all sites have less than 500 DSL lines, but only 48% of CEG's averaged sites have less than 500 lines. CEG's econometric analysis therefore cannot claim to represent accurately the variation in costs per DSLAM site in Denmark, as it is clear that the lines per DSLAM site will be overstated.

Exhibit 3.4: *Distribution of xDSL lines per site, for DSLAM sites and average sites per edge router [Source: Erhvervsstyrelsen, Network Strategies]*

New Zealand appears to have more DSL sites with large numbers of DSL lines, while the proportion of smaller nodes (in terms of number of DSL lines) in Denmark and New Zealand may be broadly comparable.

Any effect of DSLAM sites with relatively few DSL lines (such as in rural areas) on average DSLAM costs in New Zealand is therefore not likely to be greater than that observed in Denmark.

However these findings also imply that much greater economies of scale might be achieved in New Zealand than in Denmark, due to the greater number of DSLAM sites with large numbers of DSL lines. Therefore there is a case that the average cost per DSLAM in New Zealand could be lower than in Denmark.

The other factor discussed by CEG as being influenced by line density is the trench length from the DSLAM to the handover point. A longer trench may incur greater costs, due to additional materials and labour required. However the objective in this benchmarking exercise should be to determine whether trench lengths in Denmark are sufficiently different to those in New Zealand to warrant making an adjustment.

In its report, CEG graphs distances from the DSLAM location to the handover point for the Chorus network, however does not state the unit of measurement. We have assumed that these distances are in metres. From the graph, we estimated that:

- trenches less than 10km comprise around 20–25% of exchanges and cabinets
- around half of all trenches from exchanges that are between 10–100km would be in the upper half of that band, but it would be over half of those from cabinets.
- a small number of trenches (less than 5%) are more than 100km.

It is unclear precisely what data from the Danish cost model was used by CEG for its analysis of the Danish trench lengths. No details are provided by CEG to assist in identifying how the trench lengths were derived.

Data from the Danish cost model suggests that for the edge to distribution trenches:

- the average trench length is just under 24km
- just over one third (36%) of trenches are less than 10km
- 55% of trenches are 10–50km
- 7% of trenches are in the range 50–100km
- less than 3% of trenches are more than 100km.

In fact, the relevant trenching in Denmark is somewhat longer than our analysis above suggests. In order to obtain a true picture of trench lengths for the bitstream service, we would also need to add the remote unit to edge router trenches. This is a non-trivial exercise, as these trenches typically use a ring topology. Associating the trench lengths with individual locations and services would therefore require a number of assumptions and averaging, with little prospect of the subsequent results reflecting the actual network characteristics and thus the distribution of trench lengths in Denmark.

Bitstream cost drivers in Sweden

CEG notes that the Swedish model does not utilise extensive geographic information, unlike the Danish cost model. In its analysis of sites, CEG focuses on a sample of 64 of the 139 edge locations, however there are many more DSLAM sites in the network. The Swedish cost model contains information on the number of edge nodes, broadband locations and average DSL lines per location, for various different categories of site (Exhibit 3.5). We can estimate from this information that there is an average of around 260 DSL lines per site across all broadband locations.

Maximum lines per site	*Edge nodes*	*Broadband locations*	*Average xDSL lines per broadband location*
50	–	396	33
100	–	683	32
250	–	1,435	69
500	1	1,055	152
1000	1	760	298
5000	19	594	760
10 000	40	87	1,593
50 000	69	81	2,589
No lines	9	–	–
Total	139	5 091	

***Exhibit** 3.5: Nodes and average lines per node, Sweden [Source: PTS]*

CEG's analysis of Swedish trench lengths[30] is somewhat misleading. It describes the four geographic categories as "urbanisation categories", however the reality is somewhat different:

- Category A – Stockholm, Göteborg and Malmö
- Category B – large cities with over 100 000 inhabitants
- Category C – northern Sweden
- Category D – southern Sweden.

30 CEG (2013) *Wholesale broadband cost drivers*, January 2013, Table 4-2.

Each of the above four geographic groups thus represents a combination of urban and rural areas (Exhibit 3.6).

Geographic category	*Total trench length (km)*	*Conurbation (km)*	*Semi-rural (km)*	*Rural (km)*	*Sparse (km)*	*Rural RSM-B spur (km)*
A	1,810	922	730	82	76	–
B	169	134	35	–	–	–
C	8,436	689	570	2,841	2,389	1,947
D	4,603	636	1,335	2,396	6	231

Exhibit 3.6: *Total remote to local trench lengths, Sweden [Source: PTS]*

CEG's analysis implies that its calculated trench lengths per site for each of the above geographic categories are representative of urban and rural averages, but examination of the above table shows that 43% of the trenches in category D are in urban or semi-rural areas. This suggests that an average rural trench length in category D is likely to be somewhat longer than CEG's average of 6.9km. This also applies to category C, where 15% of trenches are in urban or semi-rural areas.

Thus comparing CEG's estimates with urban and rural trench lengths in New Zealand may be misleading. Unfortunately the Swedish model does not provide information on the distribution of line lengths – only that the average length of a remote unit to edge router link is 6.6km. As in the case of New Zealand, we would expect a mix of short and long trenches, however the Swedish model is based on averages and so we are unable to assess whether this mix may be comparable with that in New Zealand or not.

Adjusting for line density

CEG derived two econometric models to derive a cost estimate for each New Zealand node one based on the Danish cost model and the other on the Swedish cost model.[31] These

31 CEG (2013) *Wholesale broadband cost drivers*, January 2013.

models claim to estimate a cost per node based on lines per DSLAM site and trench distance per DSLAM location.

However in deriving New Zealand estimates from these two models, CEG used data from the first access switch level rather than the exchange or the cabinet level.

CEG describes how it determined the costs used in its econometric models:

> To estimate the average core network unit bitstream cost at each edge router location, we have taken the assets provisioned by the model at these locations and uplifted them by any mark-ups used by the model, such as spares. This number of assets is multiplied by the unit price from the model to calculate the equipment and materials capital costs. Installation capital costs and maintenance and annual supplier support operating costs are calculated from this amount using the same multipliers applied by the model at the network-wide level. Finally, the capital costs are annualised, consistent with the process used for total costs, and the annual costs are added together to form a total annual cost for each cost component at each edge router location.[32]

The so-called "bitstream" costs derived by CEG therefore include only the costs at the edge router location. Note that the edge router is not the handover point, so this cost estimate does not encompass the full bitstream service. Any adjustments calculated on this basis are thus based only on partial costs – and it is inappropriate to assume that the adjustment is also valid for the complete bitstream service.

As noted above, CEG's econometric analysis is based on highly averaged data, which omits valuable information, in particular for DSLAM sites with low line density. As it is based on averaged data, which we have demonstrated to be divergent from the actual characteristics of Danish DSLAM sites, it fails in its objective to adjust for differences between Danish and New Zealand line densities.

As noted above, it was unclear as to what data CEG used to represent trench distance in Denmark. Use of inappropriate trench distances would invalidate CEG's proposed

32 *Ibid.*

adjustments to the price derived from the Danish model. It is also clear that the CEG's proposed adjustments for line density are also inappropriate.

In its derivation of the Swedish econometric model, CEG made a number of assumptions. Unlike the Danish econometric model, for which it was possible to obtain a bitstream cost for each node, the original Swedish regulatory cost model does not identify the total costs at individual edge locations. Some costs are provisioned by edge location, but other costs are determined only over the entire network (and then allocated on a per-unit basis to services rather than to individual edge locations). CEG therefore made a number of assumptions so that it could then estimate a total cost per edge location. These assumptions included both network design rules and some relatively arbitrary allocation proportions. So in effect, the cost per edge location derived by CEG does not reflect the distribution of actual network costs in Sweden, but the assumptions applied by CEG. To that end, its use as a "benchmark" of Swedish costs must be considered highly questionable. We therefore do not consider that CEG's proposed adjustments to the price derived from the Swedish model are valid for use in estimating costs for New Zealand.

3.5 Ratio benchmarking

As an alternative to the econometric adjustment of the UBA prices to reflect a perceived difference in spatial density, CEG proposes benchmarking the UBA price as a function of the UCLL price. It refers to this approach as "ratio benchmarking".

With this approach CEG calculates the UBA price as a percentage increment of the UCLL price, where that percentage is estimated from the percentage increments observed in the benchmark data set.

This approach relies on the implicit assumption that there is a direct or indirect relationship between the UCLL price and the UBA price. We do not believe that such a relationship exists.

The UCLL service has no cost elements in common with the UBA service – the services are completely distinct, and so it is extremely unlikely that the costs of UBA are dependent on the costs of UCLL – which is precisely what the above assumption implies. While there may be some cost drivers which are common to both services, it does not necessarily follow that there should be a directly proportional relationship between the costs of the two services.

While spatial density is clearly a significant influence on the costs of UCLL, CEG claims that it is the link via which a relationship between UCLL and UBA can be established.

CEG's assumption is equivalent to saying that the cost of a mobile network to provide coverage for users in an underground rail system should be some proportion of the cost of the rail network. The costs of both will be driven by the spatial characteristics of the area covered by the networks, but it would clearly be inappropriate to estimate the cost of the mobile service as a percentage of the rail infrastructure costs.

As UCLL and UBA are supported by quite distinct network elements and infrastructure, there is no evidence to support the claim that a high UCLL cost would translate into a high UBA cost – or conversely that a low UBA cost would be indicated by a low UCLL cost.

The Commission's approach, of estimating a (non-ratio) benchmark of the uplift of UBA over UCLL, does not assume the existence of a relationship between UCLL and UBA costs. For this reason, it must be preferred over the ratio benchmarking approach.

3.6 Are there any missing costs?

The Chorus (CEG)[33] and Enable-Whangarei-Ultrafast[34] submissions both argue that the costs of fibre backhaul should be added to the benchmark price to account for cabinet-based services in the New Zealand network. Network Strategies submits that these costs do not represent additional costs that should be included in the benchmark price.

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33 CEG (2013) *Wholesale broadband cost drivers,* January 2013, page 15.

34 Enable Networks Ltd, Whangarei Local Fibre Company Ltd and Ultrafast Fibre Ltd (2013) *Joint submission on unbundled bitstream access service price review draft determination dated 3 December 2012*, 1 February 2013, page 8.

The inclusion of additional fibre backhaul costs would cause double counting in the benchmark price. The costs used in the benchmark set (Denmark and Sweden) are derived using both copper and fibre as an input to their network models, therefore including fibre backhaul as an addition would effectively be including the cost of fibre twice.

Labelling "cabinetisation" as special and unique to the New Zealand fixed network is misleading. A level 2 DSL service requires physical accommodation for DSLAM equipment that is separate from the exchange. This means that any model reflecting a level 2 service will necessarily include the costs of cabinets. Regardless of the fact that different terminology may be used in that particular country, the equipment must be equivalent. If indeed, the New Zealand cabinets are more expensive than equivalent housing used in the benchmark countries, then the Commission should not be compensating Chorus for building an inefficient (that is, not a Modern Equivalent Asset) network.

3.7 Connection charges: benchmark or actual?

Chorus argues that connection and transfer charges should be set on a cost-plus basis[35]: that is, third party costs plus administrative charges plus a margin. Chorus claims that these charges are straightforward to identify since they consist largely of third party charges while benchmarked charges based on only two countries would be unsound. In other words, Chorus proposes that actual costs be used as the basis of connection charges. However Chorus does not produce any evidence that demonstrates that actual costs are efficiently incurred in New Zealand. If there are inefficiencies in the procurement process then these would be passed on to access seekers if the Commission accepts the Chorus proposal. The use of a benchmark approach for comparable services, in contrast, provides the Commission with an efficient standard.

35 Chorus (2013) *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013. See Appendix G.

We recommend that benchmarking be used as the basis of connection charges.

3.8 Summary

If an adjustment to the benchmarks is being proposed, then it must be proven that there are firm grounds for that adjustment. We do not believe that Chorus and its consultant CEG have demonstrated that New Zealand is sufficiently different to the benchmark countries with regards to spatial density to warrant an adjustment on these grounds.

A key problem with several of the adjustments suggested by Chorus and CEG – in particular adjustments associated with spatial density and bandwidth – is that support for these adjustments focuses only on individual cost elements, such as DSLAMs and trench lengths, without consideration for how these factors may also affect other cost elements which may also have an influence on bitstream costs.

It is inappropriate to isolate particular cost elements, identify a relationship with some other factor (such as spatial density) and then advocate an adjustment based on that factor without considering whether or not that same factor also affects other cost elements which may also have an influence on bitstream prices.

Furthermore, we find that CEG's econometric analysis misrepresents the relationship between bitstream cost and the relevant parameters, namely number of DSL lines per DSLAM and trench distance per DSLAM location, due to CEG's derivation of both the explanatory variables and the predicted variables. This derivation required additional assumptions made by CEG on factors such as network design rules and cost allocation in Sweden, as well as gross simplification of the underlying data. The end result is that the econometric models do not provide an accurate representation of actual networks and validated regulatory costs in Denmark and Sweden, and thus fail to adjust the data for differences in spatial density between New Zealand and the benchmark countries.

4 Price point selection

Chorus recommends that the Commission selects a price point above the benchmark mean and within CEG's adjusted range[36]. This recommendation is based on two main assertions:

- the asymmetric impact on consumers of regulatory error must be taken into account
- low copper prices adversely affect incentives to invest.

Sapere Research Group, on behalf of Chorus, argues that:

> benchmarking is 'prone to error (in this case potentially choosing a price that does not reflect the additional costs to provide the service) due to the limited information available to the Commission and that the correct price is unknown.[37]

The probability of error should cause the Commission to select a price point at the 75th percentile, according to Sapere Research Group, as 'this error can be expected to result in asymmetrical economic effects'[38]. A number of examples are provided of the Commission previously adopting a price point higher than the median in relation to services other than UBA and UCLL in addition to non-telecommunications services. It is difficult to see the

36 Chorus (2013) *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013. See Appendix C.

37 Sapere Research Group (2013), *Comment on how to give the best effect to the purpose of Section 18*, 1 February 2013. See paragraph 13.

38 *Ibid*, paragraph 21.

relevance of most if not all of these examples to UBA – for example, the selection of WACC values for a 2004 gas control inquiry[39].

As Network Strategies outlined in the submission stage of this process[40], there is good reason to believe that benchmarks based on UBA services in Denmark and Sweden would deliver reasonably accurate results for New Zealand. Other parties have provided further information in submissions which should assist the Commission in its benchmarking exercise. For example, Flip notes that from its own experience 'the additional cost of the equipment to convert unbundled copper into a full Internet service is in the range of $3.50 – $4.00'[41] and also points out that Chorus would enjoy economies of scale not available to other smaller firms. This evidence would suggest that in fact the benchmark estimate overstates the true cost.

The criticism by Sapere of the Commission's selecting the median price point in its 2007 UCLL decision relies on its claim that 'if the price of the regulated service is reduced, incentives to invest and innovate in substitute services are diminished, and risks faced by investors in those substitute services are increased'[42]. However in fact the impact of a change in the price of the regulated service is ambiguous. On the one hand, a UBA price that exceeds cost by a significant margin may lead to windfall gains for the access provider (inevitably at least partly at the expense of the consumer), and drive incentives (at the wholesale level) for a slower transition to fibre than might otherwise have been the case. On the other hand a 'low' UBA price might encourage copper retail propositions but drive wholesale incentives towards faster fibre deployment and earlier availability of higher value fibre retail propositions. In reality the impact on fibre investment and uptake of UBA pricing is much more complex than this (and indeed than indicated by the Sapere report). While wholesale price differentials may play a part in fibre broadband product uptake, there are many other factors that will ultimately affect market development. For example,

39 *Ibid*, paragraph 19.

40 Network Strategies (2013) *Benchmarking issues in the Unbundled Bitstream Access Draft Determination*, report no 32023, 30 January 2013.

41 Flip Limited (2013), *Unbundled bitstream access service price review consultation*, 1 February 2013.

42 Sapere Research Group (2013), *Comment on how to give the best effect to the purpose of Section 18*, 1 February 2013. See paragraph 44.

the ability of retailers to differentiate their product offerings on a variety of levels, attractiveness of broadband products to high-value or mass-market customers, the availability of desirable content and the impact of substitution to mobile broadband services.

5 UFB pricing constraint

On behalf of Chorus, CEG proposes[43] that the Commission should introduce an upward adjustment to the benchmark price on the basis that New Zealand's circumstances are different from the countries in the benchmark sample. CEG claims that this upward adjustment would enable Chorus to recover the forward-looking costs of its investment in copper. The key premises of the CEG argument are summarised as follows:

- Bitstream demand has been growing in recent years.
- Chorus has recently undertaken significant investment in assets to supply bitstream services, namely its cabinetisation programme, DSLAMs, fibre transmission and data switches.
- The Government has intervened in the market through its UFB tender and, with subsidies, is accelerating fibre deployment in New Zealand.
- The UFB initiative has resulted in Chorus committing to deploying a network which will compete with its copper network.
- From 2014 demand for regulated copper services will decline as demand increases for fibre-based services.
- The contractual wholesale UFB prices constrain the prices that Chorus is able to charge for its copper network.
- The Danish and Swedish cost models make no allowance for declining asset utilisation or 'competitive constraints' from fibre.
- Without incorporating adjustments for the above Chorus will not be able to recover the costs of its investment in copper.

43 CEG (2013), *Effect of fibre on copper bitstream prices*, January 2013.

On the basis of the foregoing argument CEG makes a recommendation that an upward adjustment is required to the Commission's benchmark of at least $2.75.

We preface our comments by noting that the CEG argument bears some resemblance to arguments put forward by Chorus (formerly Telecom) in the context of the Telecommunications Service Obligation (TSO) Determinations for the years of 2004/05[44] and 2005/06[45]. A TSLRIC model was used in the assessment of TSO costs, and Chorus argued that the outcome of the optimisation process in the modelling was that it could not recover its costs relating to investment in assets to supply the TSO service. At that time the Commission accepted the Chorus/Telecom argument that the model did not enable it to cover the cost of investment, and so it ceased model optimisation by explicitly rejecting the inclusion of new technologies in the modelling process. As Network Strategies argued at the time[46], this was inconsistent with statutory requirements to assess the TSO net costs using an efficient service provider standard (TSLRIC). The Commission's fundamental change was driven apparently by its acceptance that Chorus was not sufficiently compensated via the expected depreciation captured by asset tilts for the introduction of new technologies[47].

As in the TSO case, CEG argues that depreciation allowances are insufficient to enable Chorus to achieve cost recovery. However in the case of UBA, benchmarking based on the cost models of other countries has been applied to estimate a cost-based price, so the depreciation referred to by CEG is at best notional depreciation.

CEG notes that Chorus ought to be able to recover replacement cost for copper assets as:

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44 Commerce Commission (2008) *Revised Draft Determination for TSO Instrument for Local Residential Telephone Service for period between 1 July 2004 and 30 June 2005*, 13 May 2008.

45 Commerce Commission (2008) *Revised Draft Determination for TSO Instrument for Local Residential Telephone Service for period between 1 July 2005 and 30 June 2006*, 26 May 2008

46 Network Strategies (2008), *Report on TSO revised draft determinations 2004/05 and 2005/06*, Report No. 28018, 20 June 2008.

47 Vodafone New Zealand, a liable entity for payment to Telecom of TSO contributions, subsequently won a legal challenge to these two Determinations (and a subsequent appeal to the Supreme Court), taken on the basis that in calculating the net TSO cost the Commission had failed to model the efficient provision of TSO services.

> … these expenditures are recent investments and … the forward-looking costs of providing the same capabilities today would likely be fairly close to the actual amounts spent by Chorus.[48]

In other words, CEG's main focus is on actual cost recovery, as opposed to efficient cost recovery. 'Capital recovery policies' or actual cost recovery was also the prime consideration of the economists (who wrote in the context of rate-of-return regulation in the US in the early 1990s) cited by CEG in relation to the 'window of opportunity'. These economists argued that straight-line depreciation may not achieve cost recovery for regulated firms under conditions of technological change and competition[49]. One of the driving forces for the introduction of the LRIC standard (which occurred later in the 1990s in the US) was the lack of incentives actual cost recovery placed on firms to invest efficiently. Even if capital expenditure is 'recent' it does not necessarily follow that it was incurred efficiently.

CEG argues that since the proposed regulated prices do not appear (on certain demand assumptions) to be high enough to promote actual cost recovery, then the underlying cost model must be adjusted. In fact Chorus made a commercial judgement to engage in the UFB tender. In doing so it undertook detailed business modelling, and acknowledged that fibre uptake is uncertain.

> … the level of future demand for services delivered via the UFB network is highly uncertain. In addition, the effect on New Chorus' revenue, profitability and cash flow of various fibre uptake scenarios is complex and unpredictable.[50]

Furthermore Chorus predicts that when end users connect to the UFB they will simultaneously disconnect from the copper network, and consequently its future revenues will be sensitive to 'the mix of services that end users take up via the UFB'[51].

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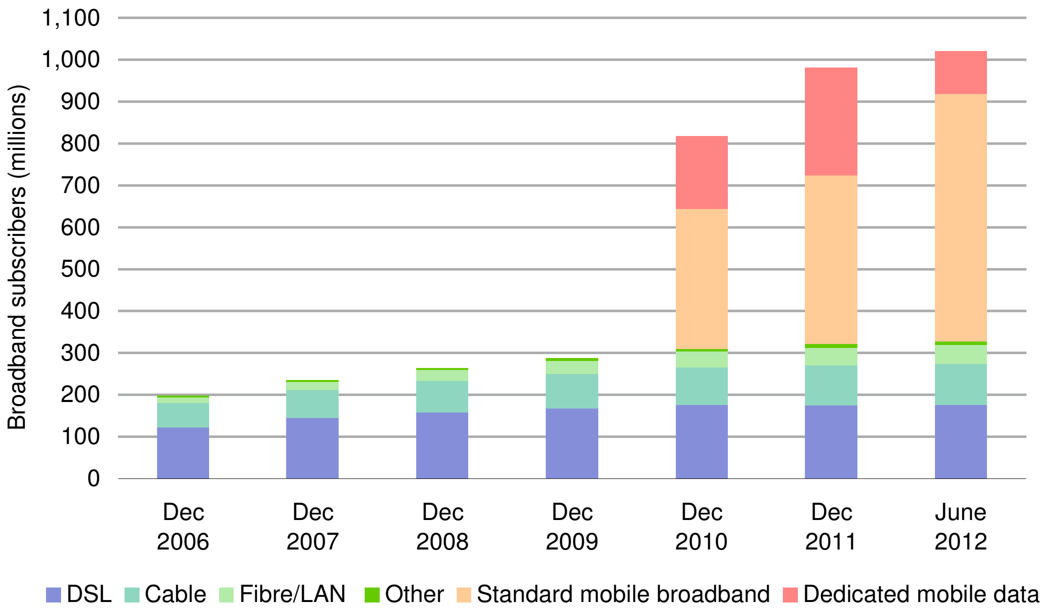
48 CEG (2013), *Effect of fibre on copper bitstream prices*, January 2013. See paragraph 55.

49 See Crew and Kleindorfer (1992), *Economic depreciation and the regulated firm under competition and technological change*, Journal of Regulatory Economics; 4:51-61, 1992. See page 59.

50 Telecom (2011), *Share in two journeys*, 13 September 2011. See page 201.

Chorus also explicitly acknowledged[52] that future revenues may also be affected by fixed-mobile substitution (FMS). In many countries fixed line subscriptions are declining while mobile broadband uptake increases rapidly (Exhibit 5.1).



Standard mobile broadband: mobile subscriptions which advertise data speeds of 256 kbit/s or greater and which have been used to make an Internet data connection via IP in the previous 3 months

Dedicated mobile data: subscriptions which are purchased separately from voice services either as a stand-alone service (modem/dongle) or as an add-on data package to voice services which requires an additional subscription

Exhibit 5.1: *Broadband subscribers in the OECD countries [Source: OECD]*

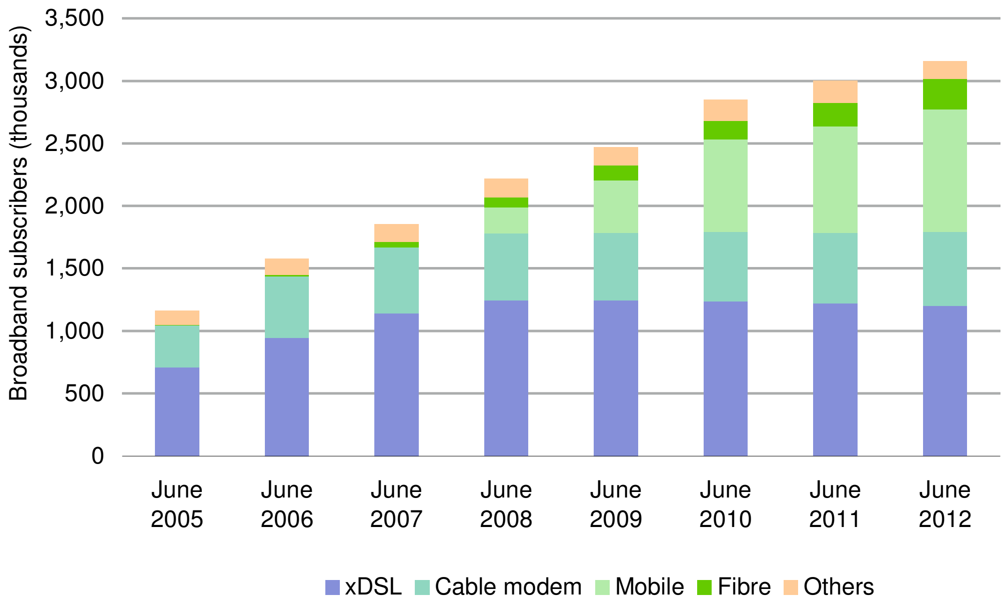
This trend certainly may affect actual cost recovery for copper products. Such trends make it difficult to isolate the impact on Chorus' copper cost recovery that may be attributed to the Government's UFB policy. Arguably Chorus is exposed to the normal risks associated with a business of its kind, and as such will have taken these commercial risks into account in its investment decision-making. Another issue that complicates CEG's attempt to estimate the impact of the 'UFB constraint' is that, by its own admission, previous

51 *Ibid*, page 130.

52 *Ibid*, page 203.

investment of Chorus is wherever possible being utilised for fibre[53] (for example, ducts and poles).

CEG's claim that an adjustment is required to the Danish and Swedish cost modelled prices rests on the apparent failure of the cost modellers to accelerate depreciation and capture declining asset utilisation. In particular CEG argues that the benchmark prices do not 'reflect future price constraints imposed by competing fibre networks'[54]. So what is the historical and current state of the market in Denmark and Sweden with respect to copper and fibre products? In fact recent data indicates that copper subscriptions are declining in both countries, while fibre and mobile broadband subscriptions continue to increase (Exhibit 5.2 and Exhibit 5.3). This implies that the incumbent copper providers are facing competitive constraints, and as such it is difficult to see why the parameters of these cost models should be inappropriate for New Zealand.

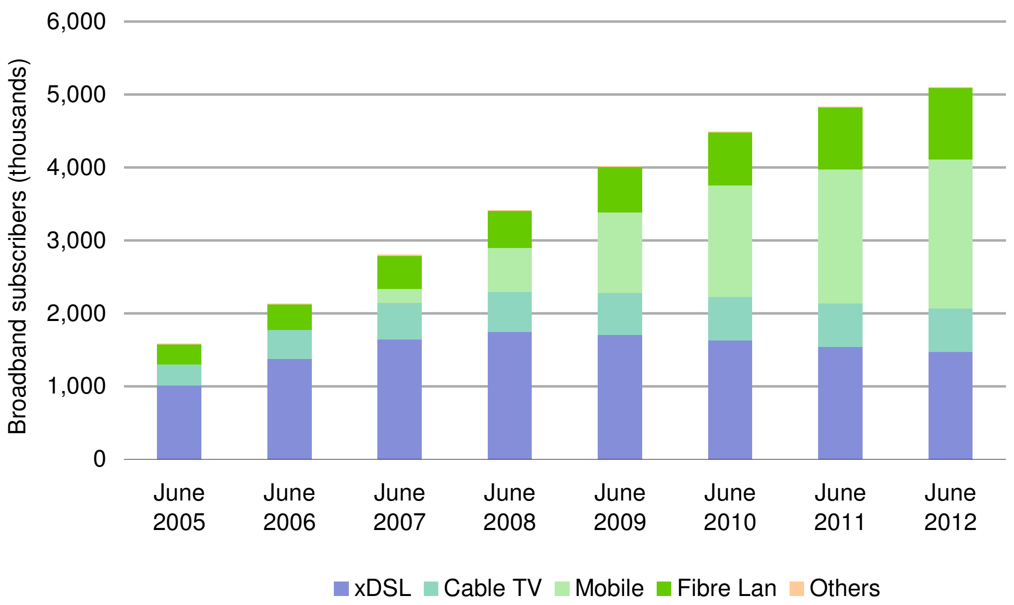


Note: Mobile subscribers only include dedicated data services.

Exhibit 5.2: *Broadband subscribers 2005 to 2012 – Denmark [Source: ERST]*

[53] *Ibid*, page 98.

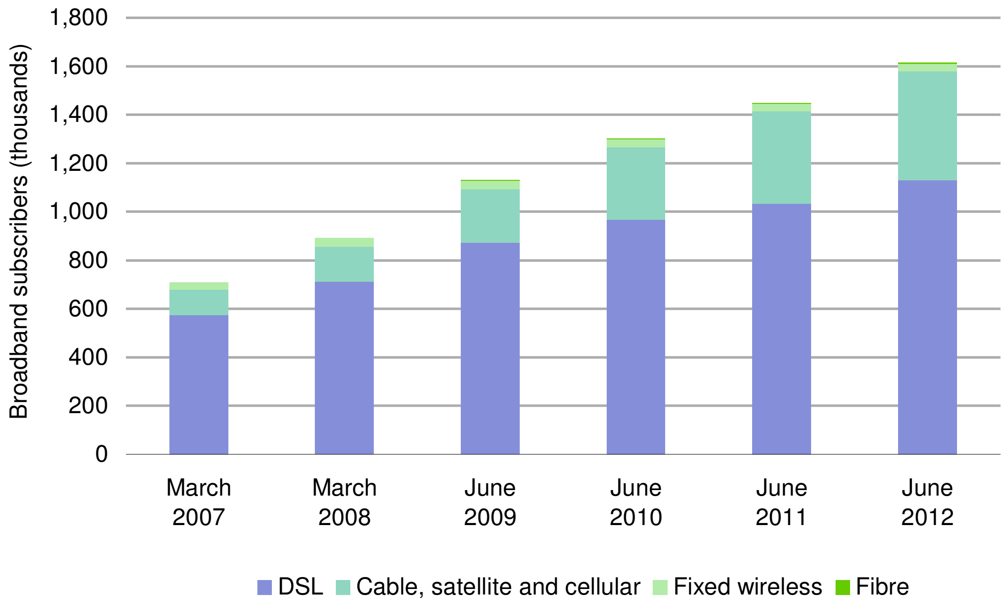
[54] CEG (2013), *Effect of fibre on copper bitstream prices*, January 2013. See paragraph 79.



Note: Mobile subscribers correspond to stand alone services – subscriptions which have been used for mobile packet data only.

Exhibit 5.3: *Broadband subscribers 2005 to 2012 – Sweden [Source: PTS]*

Statistics New Zealand data indicates that DSL subscriptions are still increasing and mobile broadband is most certainly increasing, while fibre subscriptions are still at a very early stage (Exhibit 5.4).



Note: Cellular connection type includes all connections via data cards and excludes mobile phone connections to the Internet.

Exhibit 5.4: *Broadband subscribers 2007 to 2012 – New Zealand [Source: Statistics New Zealand]*

CEG recommends that depreciation of UBA assets be front-loaded since:

> ...the Commission's focus in this determination should be to determine what prices Chorus needs to be able to charge now and in the future such that it can expect to recover the ORC [Optimised Replacement Cost] of the assets for serving bitstream over the economic life of those assets. [55]

Such an approach, according to CEG, would remedy the constraints placed on copper pricing by the contractual prices of the UFB initiative. Arguably, however, Chorus may already have recovered a significant proportion of the relevant costs of its investment over recent years, given that the previous UBA pricing principle was retail-minus. It is not the case that cost recovery is only just commencing where the lifetime of assets spans the

55 *Ibid*, paragraph 77.

period in which the retail-minus methodology applied as well as the cost-based methodology.

CEG's recommendations effectively ask the Commission to reduce the risk that Chorus is facing. If the Commission is minded to follow this advice then it would also be necessary to reduce the notional weighted average cost of capital (WACC), as with a reduction in risk the asset beta parameter should be reduced. This would have the effect of reducing the UBA price. We note that CEG in its estimates of the required adjustment to the benchmark arbitrarily assumes a WACC of 9% which it says does not represent the CEG view of Chorus' cost of capital but is similar to the WACC (8.77%) applied by the Commission recently to electricity distribution services[56].

It should be noted that Network Strategies is not proposing that an adjustment be made to the benchmark results on the basis of WACC values. In fact while WACC values typically have a significant impact on cost model results, WACC is highly country-specific. As such, each WACC used in cost models has been judged appropriate by regulators in their own countries. In the Swedish model the WACC is 8.8% for 2013[57], while in the Danish model the WACC is 5.40% for the same time-period[58]. The wide divergence of the Danish and Swedish WACCs is the result of differences in all of the components of the WACC. For example the assumption for the beta in the Danish WACC is 0.50 while for Sweden a range of 0.77 to 1.08 is considered[59].

As already indicated the CEG calculations of a recommended uplift are based on arbitrary assumptions. Not only is the WACC assumption arbitrary, so too are the demand assumptions which rely on UBA forecasts from Deutsche Bank. The results of the CEG calculation are highly sensitive to these forecasts. Few details are provided on the

56 *Ibid*, footnote 16.

57 PTS (2011), *Fastställande av kalkylräntan för det fasta nätet*, 2 February 2011. Note that the same WACC was applied for the subsequent models.

58 ERST (2012) *Afgørelse om fastsættelse af WACC for regnskabsåret 2011 i forbindelse med omkostningsdokumentation af priserne i TDC's standardtilbud*, 23 May 2012. Note that the WACC is calculated as 5.77% in this document so clearly some parameters changed for model version relating to 2013 prices.

59 The Swedish WACC calculation is based on the mid-point of low and high parameter estimates.

derivation of these forecasts – for example, the underlying assumptions regarding fibre uptake. Furthermore, Chorus notes in its own submission that 'the use of this existing [Deutsche Bank] information does not indicate support or otherwise by Chorus of the data'[60]. If Chorus cannot support the data its consultants have applied to estimate an uplift then it is difficult to understand how Chorus can then claim that the calculated uplift is warranted.

We recommend that the Commission makes no adjustments to the benchmark based on specific assumptions within the Danish and Swedish cost models. The selection criteria establishes that these are appropriate comparator countries for New Zealand and, as such, the modelled cost-based rate should also be appropriate. It is both unnecessary and impractical to attempt to alter benchmark values on the basis that various parameters or assumptions from the cost models should be changed to align with (uncertain) New Zealand conditions. Effectively CEG is suggesting that specific parts of cost models be altered so that they become some type of hybrid New Zealand / European cost model. This is not the aim of benchmarking, and does nothing other than increase the margin of error of the benchmark results.

60 Chorus (2013), *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013. See footnote 25.

6 Concluding remarks

Chorus and CEG claim that adjustments are required in order to amend the benchmark estimate so that it reflects New Zealand conditions. In particular CEG alleges that the benchmark should be adjusted for line density, the proportion of higher speed services and a declining copper customer base. However CEG provides no conclusive evidence that such adjustments are required. Furthermore, the quantum of the recommended adjustments is based on CEG's focus on individual cost elements of the Danish and Swedish models with no regard for how these factors may affect other cost elements that may also have an influence on bitstream costs.

In effect CEG is suggesting a radical departure from traditional benchmarking analysis, with its proposal to alter specific parts of cost models so that they become some type of hybrid New Zealand / European cost model. Such tampering with selected cost model parameters will only increase the margin of error of the benchmark results.

In total Chorus seeks to introduce seven adjustments to the Commission's UBA benchmark[61]. These are listed below, together with our recommendations.

61 Chorus (2013), *Submission in response to the Commerce Commission's Draft Determination to amend the price payable for the regulated service Chorus' unbundled bitstream access made under s 30R of the Telecommunications Act 2001*, 1 February 2013. See page 16.

Correction of Danish price

Chorus has interpreted the questionnaire response from the Danish regulator differently from the Commission and accordingly suggests the removal of the half loop price. Network Strategies has yet another interpretation of the response, and so we recommend that the Commission clarifies the meaning intended by the Danish regulator (if it has not done so already).

Benchmark weighted average price of all speed services

Chorus recommends using a weighted average of all speeds to capture shared cost, rather than the low speed option selected by the Commission. We agree that the Commission's use of the price for the lowest bandwidth service would not achieve cost recovery. As such we recommend that the average weighted price be used, as this will be independent of the distribution of services by bandwidth.

Expand benchmarking set

Chorus argues that there are grounds to include Belgium, Greece and Switzerland. The latter two countries cannot be included as their cost models have not been subject to regulatory scrutiny, nor are they publicly available. With respect to Belgium, an adjustment may make inclusion possible, but it is impractical to attempt to make the required adjustment as the cost model is not publicly available. Network Strategies recommends that none of the proposed countries are included in the benchmark sample.

Adjust for greater proportion of high speed services in New Zealand

Chorus asks for an adjustment based on higher line speeds in New Zealand than in the benchmark countries. We showed that the situation with regard to line speeds is somewhat more complex than Chorus describes. An adjustment based simply on the theoretical maximum line speed in New Zealand is very likely to over-compensate for any alleged differences in bandwidth distribution. As such we recommend that no adjustment be made to the benchmark estimate.

Account for line density

Chorus claims that adjustments are necessary in relation to line density. Chorus' consultants establish relationships between various factors, however at best these relationships only demonstrate that line density could be a potential proxy for cost drivers of the UBA service. The econometric models provided by Chorus' consultant do not provide an accurate representation of actual networks and validated regulatory costs in the benchmark countries, and thus fail to adjust the data for any differences in spatial density.

Nor does CEG demonstrate conclusively that there are differences in spatial density between New Zealand and the benchmark countries. In fact we found that there was some evidence that the average cost per DSLAM site could be lower in New Zealand than in Denmark.

Network Strategies recommends that the Commission make no adjustment on the basis of this analysis.

Apply UFB pricing constraint

Chorus asks that mass migration to UFB be taken into account in cost modelling UBA for New Zealand as this reduces the customer base on copper. Since the benchmark countries do not allow for this in their cost models, Chorus argues that an adjustment is necessary. Network Strategies recommends that the Commission makes no adjustments to the benchmark based on specific assumptions within the Danish and Swedish cost models. Furthermore, the proposed adjustment is highly sensitive to New Zealand demand assumptions and Chorus did not even endorse these assumptions.

Select a value above median for asymmetric risk

Due to asymmetric risk considerations Chorus argues that the Commission should adopt a value above the median. Network Strategies recommends that the Commission adopt the median value since there is no evidence that there is bias in any one direction. In fact, the benchmark countries are very comparable to New Zealand in many respects, and cost information provided in submissions does not support the claim that the benchmark is lower than the likely actual cost.