TSLRIC price review determination for the Unbundled Copper Local Loop and Unbundled Bitstream Access services

International comparison of TSLRIC UCLL and UBA costs and prices

Commerce Commission

Ref: 2014-20-DB-ML – BU models

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Summary

0 Introduction

0.1 Objectives

Unbundled Copper Local Loop (UCLL) and Unbundled Bitstream Access (UBA) are services that allow alternative operators' access to the local loop infrastructure of Chorus.

The Telecommunications Act 2001 (the Act) requires the Commerce Commission ("the Commission") to determine a price for the UCLL and UBA services. In the first instance the Commission is required to benchmark prices against comparable countries under the 'initial pricing principle' (IPP). If an access seeker or Chorus Limited is not satisfied with the price (either the UCLL or UBA) determined under the IPP, the Act provides that the party can ask the Commission to calculate a price for that service in accordance with the 'final pricing principle' (FPP), which is Total Service Long Run Incremental Cost (TSLRIC) for UCLL and UBA.

The Commission has received FPP requests both for UCLL and UBA: the UCLL FPP request was received in February 2013, the UBA FPP request was received in January 2014. Therefore, the Commission needs to determine a price for the UCLL and UBA services in accordance with the FPP.

To do so, the Commission developed with the assistance of TERA Consultants TSLRIC cost models for UCLL and UBA. A draft version of these models and their accompanying document were published in December 2014. The Commission sought the views of interested parties and has reviewed the models with the submissions and the cross-submissions sent by all the interested parties.

Among the comments raised by some interested parties, and especially Spark, it was argued that the draft price of UCLL and UBA was far above existing corresponding prices in other jurisdictions and in particular in Europe. Indeed, the draft UCLL price set in December 2014 is equal to NZD 28.22 while European UCLL prices generally fall within the €8 - €10 price band, i.e. NZD 13.2 – NZD 16.5. After having reviewed comments from interested parties and updated accordingly the draft UCLL and UBA models, the new draft UCLL price calculated for 2015 is NZD 26.31 while the new draft UBA price calculated for 2015 is NZD 11.35. The values calculated by the new draft TSLRIC model for the year 2015 are used to facilitate comparison with other countries. However, as the next regulatory period does not include the year 2015, these values (NZD 26.31 and NZD 11.35) are not the prices for the next regulatory period which are increased along the tilted annuity depreciation profile.

TERA Consultants has been mandated by the Commerce Commission to compare the UCLL and UBA prices and costs and understand key differences between New Zealand and other countries.

0.2 Selected countries

TERA Consultants has focused on 4 countries: Ireland, France, Denmark, Sweden. These countries have been selected because a significant amount of details is available for these countries to conduct an in-depth comparison of UCLL and UBA prices:

- The French, Danish and Swedish National Regulatory Authorities (NRAs) have published significant details about the cost of UCLL (which is also the main component of UBA) on a TSLRIC basis (called “LRAIC” or “LRIC” in Europe). In Denmark and Sweden, TSLRIC models are publicly available and in France, a document published in 2005 provides a great amount of details about TSLRIC costs.
- The Irish NRA ComReg published a decision in 2010 about UCLL costs and prices based on TSLRIC. This decision provides some information. However, it is to be noted that the level of information is lower in Ireland compared to the 3 other countries as the TSLRIC model is not publicly available.

The four countries and New Zealand have similar level of development (similar GDP per capita)[1] and therefore should experience in theory similar level of labour costs. Choosing these countries allows therefore a more direct comparison of UCLL costs (compared to for example East European countries).

Information about the cost of UCLL and UBA in other countries may also be publicly available. However, it is important to note that many countries either do not publish any information or do not follow the TSLRIC approach.

It is also to be noted that outside Denmark, the 3 other countries selected have a low level of population density and therefore are more comparable to New Zealand.

The following sources of information have been used for these 4 countries.

[1] According to the world bank, the PPP GDP per capita in 2013 in the selected countries is: Denmark: 43,782 – France : 37,532 – Ireland: 45,684 – New Zealand : 34,731 – Sweden: 44,658 (http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD)

Table 1 – Sources of the TSLRIC models or documents used in this report

	Source
Ireland	Commission for Communications Regulation (ComReg), *Response to Consultation Documents No. 09/39 and 09/62, Local Loop Unbundling ("LLU") and Sub Loop Unbundling ("SLU") Maximum Monthly Rental Charges (**decision D01/10**)*, 9 February 2010
Denmark	Danish Business Authority (DBA), *https://erhvervsstyrelsen.dk/gaeldende-prisafgoerelse-2015*
Sweden	Swedish Post and Telecom Authority (PTS), *Cost results of LRIC Hybrid Model version 7.1 ("Final Hybrid Access model v7.1 PUBLIC.xls" and "Final Hybrid Consolidation model v7.1 PUBLIC.xls")*, 26 November 2009
France	Autorité de Régulation des Télécommunications (ARCEP), *Consultation sur les methods de valorisation de la boucle locale cuivre*, April 2005

Source: TERA Consultants

It is to be noted that for Denmark and Sweden, this report is based on public versions of the TSLRIC models. As a consequence, it may be the case that actual values slightly differ from real values to set TSLRIC prices in these countries. However, TERA Consultants is of the view that this has no impact on the conclusions of this report since public and confidential versions of these models are likely to be very similar.

For New Zealand, the main source of information is obviously the TSLRIC UCLL and UBA models.

0.3 Approach

TERA Consultants' approach to compare the cost and price of UCLL and UBA in New Zealand with the cost and price of UCLL and UBA in these countries is the following:

- The report mainly focuses on UCLL. Sections 1, 2 and 3 focus on UCLL However section 4 provides a comparison of UBA increments in the 4 countries.
- The UCLL prices set in each country are not directly comparable with each other because the scope of costs is not necessarily the same. Some countries exclude some lines (such as rural lines), some countries exclude some cost categories which are recovered separately, etc. As a consequence, before conducting any comparison, it is necessary to compare costs on a *pro forma* basis. This is the objective of section 1 which details the context and the approach followed by NRA to set UCLL prices.
- Once the costs are comparable, a true comparison can be conducted. The annual cost of UCLL is always the sum of depreciated investments, operating costs (OPEX) and common costs divided by the number of active lines. Depreciated investments, which is generally the main cost category, is significantly driven by:
  - i. the length of trench,
  - ii. the cost of trench per meter,
  - iii. the number of poles,
  - iv. the cost of a pole,

v. the length of cable,
vi. the cost of cables,
vii. the depreciation parameters (asset lives, WACC, price trends).

As a consequence, a small number of parameters has a direct influence on the cost of UCLL. Therefore, section 2 focuses on the comparison of these parameters that have an influence of the cost of UCLL.

- Section 3 focuses on the cost of urban areas. Here, the Dublin area and the Auckland areas are directly compared.

0.4 Exchange rates

Throughout this report, an exchange of 1.65 between € and NZD (i.e. 1€ = 1.65 NZD) has been used. This is the rate at the 24th of June 2015.

Also, an exchange of 7.46 between € and the Danish currency DKK (i.e. 1€ = 7.46 DKK). An exchange of 9.23 between € and the Swedish currency SEK (i.e. 1€ = 9.23 DKK)

1 Background for UCLL pricing

As explained above, UCLL prices set in each country are not directly comparable with each other because the costs used to set the prices do not cover the same scope. As a consequence, before conducting any comparison, it is necessary to make sure costs are compared on a *pro forma* basis.

This section is therefore organised into 2 parts:

- The first part describes the context of UCLL pricing in the four selected countries and in New Zealand (see section 1.1),
- The second part puts the UCLL prices in different countries on a *pro forma* basis (see section 1.2).

1.1 How have the prices of UCLL in each country been set?

1.1.1 France

In France, the current UCLL price is equal to €9.05, which is NZD 14.93 per line and per month. This price has been very stable since 2005. In the 2005-0834 decision, the French NRA ARCEP defined a costing methodology to determine UCLL in 2005 and has never changed it since that time (it has only changed some parameters such as the asset lifetimes and the WACC). This costing methodology is called "*Coûts Courants Economiques*" which can be translated into "Economic Current Costs". This approach is in fact a top-down approach whereby the depreciation methodology is very different from the depreciation used in the statutory accounts (such as straight line historical cost accounting). Indeed, ARCEP imposes on the incumbent to depreciate its past investments using a tilted annuity formula.

Because this approach is a top-down approach (which means for example that fully depreciated assets are valued at zero), the results of this approach cannot be compared with New Zealand's TSLRIC draft UCLL prices. However, before 2005, ARCEP was relying on a TSLRIC bottom-up model developed by the incumbent to set UCLL prices. ARCEP published in particular many details about the cost components of UCLL on a TSLRIC basis in a document published in 2005[2]. For example, the table below (in French), provides for each cost item (for instance, in the 3rd line "*Génie civil Conduite*" means trenches with ducts), the inventory of assets (number of kilometres of trenches, number of poles, etc.), the unit price of each asset, the investment, the depreciation charge, etc. This table is an output of the TSLRIC model developed for UCLL and provides a cost per line for the CAPEX part of €7.5 (i.e. NZD 12.37).

[2] See ARCEP, Consultation sur les méthodes de valorisation de la boucle locale cuivre

Table 2 – Results of the bottom-up TSLRIC cost models used to derive UCLL price in France in 2002

Nombre de paires en distribution et en transport (millions)								32,7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Génie civil	Milliers de kilomètres	Invest. unitaire en euros	Part défalquée	Valeur à neuf en millions d'euros	Paramètres d'actualisation		Coût total annuel en millions d'euros	Coût mensuel par ligne en euros
					Taux composite h	Durée de vie T		
Génie civil Conduite	359	50 009	15%	15 260	10,4%	30	1 515	3,9
Génie civil pleine terre	89	13 720		1 221	10,4%	20	133	0,3
Total GC				16 481			1 649	4,2
Câbles et infrastructures aériennes	Millions de paires kilomètres ou de poteaux	Invest. unitaire en euros	Part défalquée	Valeur à neuf en millions d'euros	Paramètres d'actualisation		Coût total annuel en millions d'euros	Coût mensuel par ligne en euros
					Taux composite h	Durée de vie T		
C distrib conduite	23,0	107		2 454	10,4%	20	268	0,7
C distrib pleine terre	2,4	88		212	10,4%	20	23	0,1
C distrib aérien	8,2	165		1 350	10,4%	15	164	0,4
GC aérien	10,0	127		1 265	10,4%	15	154	0,4
Points de concentration	8,6	59		509	10,4%	20	56	0,1
C transport conduite	66,0	56		3 723	10,4%	20	407	1,0
C transport pleine terre	7,4	64		474	10,4%	20	52	0,1
C transport aérien	1,5	165		247	10,4%	15	30	0,1
Total Câble				10 235			1 155	2,9
Répartiteurs et sous-répartiteurs	Nombre	Invest. unitaire en euros	Part défalquée	Valeur à neuf en millions d'euros	Paramètres d'actualisation		Coût total annuel en millions d'euros	Coût mensuel par ligne en euros
					Taux composite h	Durée de vie T		
Sous-répartiteur	114 000	6 250		713	10,4%	20	78	0,2
Répartiteurs	12 041	48 479		584	10,4%	20	64	0,2
Total Répartiteur				1 296			142	0,4
Total				**28 013**			**2 945**	**7,5**

Source: ARCEP

On top of this, €4.66 of OPEX and common costs (i.e. NZD 7.69) should be added to derive a total national cost for UCLL of €12.16 per line and per month (i.e. NZD 20.06).

It is interesting to note that the price of UCLL was in the end not set at €12.16 (i.e. NZD 20.06) but at €10.5 (i.e. NZD 17.32). This is because ARCEP only considered the cost of UCLL for about two thirds of the lines in France. More precisely, ARCEP calculated a cost for the lines covering most dense areas of the countries making two thirds of the lines (C1) and the cost of the other lines (C2) and the price was set at 95% x C1 + 5% x C2 = €10.5.

As a consequence, to compare TSLRIC prices in France to the draft UCLL price in New Zealand, the following steps are needed:

- Do not consider existing or past price but consider as a starting point the cost of UCLL of NZD 20.06 for the full country;
- Change the annuity formula from a standard annuity (without price trends) to a tilted annuity formula.
- Calculate the national cost per line and per month in 2015 and not in 2002 using price trends published by ARCEP in 2005.

1.1.2 Ireland

The current UCLL price in Ireland is €9.91[3]. However, this price is not comparable with other countries since alternative operators in Ireland have to pay separately the cost of repairing faults. A Monthly Fault Rental Charge of €0.96 has to be added on top of €9.91 to get a comparable UCLL price. As a consequence, the comparable UCLL price is €10.87 (i.e. NZD 17.93).

This price is the result of a decision from the incumbent Eircom to decrease its UCLL price by €2.50 compared to the UCLL price set by the NRA ComReg in 2010[4], due to line scope reduction consistent with observed unbundling by OAOs. As only most densely populated areas were actually unbundled by OAOs, UCLL price was updated downwards to reflect unbundled exchanges costs[5].

As a consequence, it is necessary to understand the initial decision from ComReg that was issued in 2010[6]. This decision resulted in a UCLL price of €12.41 + €0.96 = €13.37 (i.e. NZD 22.08). To reach this decision, ComReg developed its own TSLRIC cost model for UCLL. The TSLRIC model was calculating a national average cost for UCLL greater than NZD 22.08. But ComReg decided to calculate the cost of UCLL only for those lines that are likely to be unbundled (scope greater than those currently unbundled based on exchanges with more than 2,500 working lines) and only for those lines that are not longer than 5km from the exchange. ComReg used a similar weighting approach to the one used in France (95%/5%). It derived a price of UCLL equal to €12.41 which is obviously lower than the national UCLL average cost.

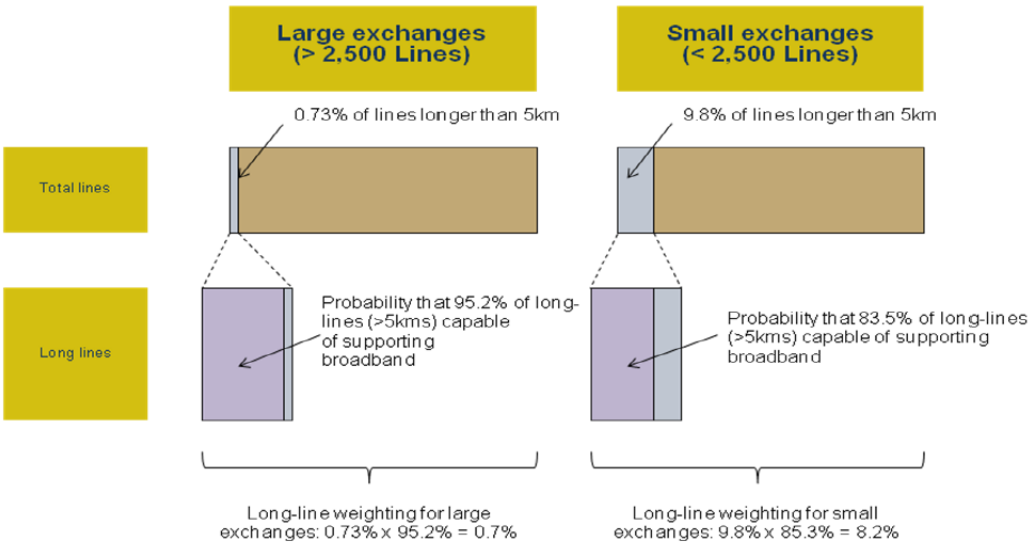
[3] See Eircom's eircom Access Reference Offer Price List

[4] http://www.comreg.ie/_fileupload/publications/ComReg1301.pdf

[5] *"More recently, in January 2013, Eircom reduced the rental price for LLU from €12.41 to €9.91, as noted in ComReg Information Notice 13/01. Eircom's main reason for the change in the price was due to the fact that less exchanges have been unbundled by OAOs over the past few years compared to what was initially envisaged as part of the LLU pricing review in 2010"* – Commission for Communications Regulation, Price control obligation in relation to current generation Bitstream (document 13/90), 19 September 2013.

[6] Commission for Communications Regulation (ComReg), Response to Consultation Documents No. 09/39 and 09/62, Local Loop Unbundling ("LLU") and Sub Loop Unbundling ("SLU") Maximum Monthly Rental Charges (decision D01/10), 9 February 2010

Table 3 – Scope of lines considered in Ireland to set UCLL prices.



Source: ComReg

As a consequence, to transform the Irish UCLL price into a *pro forma* UCLL price, it would be necessary to:

- Update the price for 2015 (it was calculated as an average of the period 2010-2012);
- Include all the lines;
- Include the cost of repairing faults;
- Also ETP is included while it is excluded in all other countries and has therefore been removed. A monthly unit cost of around €1 has then to be removed[7].

While the Irish UCLL model is not publicly available, a price range for all lines in 2015 can be inferred from cost distribution in Denmark and New Zealand: indeed, as ComReg provided the scope of lines on which the 2010 price was based, one can infer a national cost assuming costs are distributed similarly to Denmark and/or New Zealand.

Thus, the *pro forma* UCLL price can be estimated between NZD 44 and NZD 50 (see Appendix in section 0).

1.1.3 Denmark

The Danish NRA DBA published its updated TSLRIC models for UCLL in late 2014. The costs available in this model can directly be used to compare with New Zealand since the model is:

- A TSLRIC model,

[7] TERA estimate

- Based on national costs.

The current price for UCLL is NZD 12.75 per line and per month.

NB: in Denmark, DBA has decided to model a copper network which includes the demand from the incumbent's copper network, CATV network and FTTH network. This is therefore a fictive network aggregating the demand from all networks owned by the incumbent.

1.1.4 Sweden

Over the last few years, the UCLL price in Sweden has evolved around SEK 90/line/month (i.e. NZD 16.09). The current UCLL price in Sweden is SEK 96 in 2014 and 2015 and was for example SEK 88 in 2011 and SEK 84 in 2009, date at which the last TSLRIC cost model is publicly available. Changes from a year to another are mainly explained by small parameters changes (for example, before 2014, the WACC was 8.8% while it is now 7.5%). It is also to be noted that the current UCLL price is based on FTTH + FWA MEA but this was not the case in 2009: *"The access network in the bottom-up model should be modelled using a fibre access network as the appropriate modern technology. However, radio may be modelled as suitable modern technology where this is cost effective."*[8]

In 2009, when the last TSLRIC model was released the UCLL price was SEK 84 (i.e. NZD 15.02)[9].

Figure 1 – Results of the UCLL TSLRIC model in 2009 (SEK 252 / quarter = SEK 84 per month)

2,2 Raw copper costs - ongoing costs		Per quarter
Raw copper 2 wire		252
Shared raw copper, 2 wire		97
Raw sub-loop 2 wire		185
Shared raw sub-loop 2 wire		74
2,3 Point-to-point raw copper costs		Per quarter
PTP Raw copper 2 wire		504

Source: PTS

The 2009 TSLRIC model is mainly made of copper. It includes all the lines and excludes ETP costs. The scope of cost is therefore directly comparable to other countries.

[8] PTS, Draft Model Reference Paper, Guidelines for the LRIC bottom-up and top-down models, (§12.2.2).

[9] http://www.pts.se/upload/Beslut/Telefoni/2009/hybrid-model-cost-results-of-lric-v7-1-091126.pdf

It is however relevant to note that the copper model includes FWA in the most remote areas. However, considering the fact that it is not easily possible to replace this by copper and that only 0.1% of the customers are covered with FWA (for 0.5% of the annual costs – M€18), FWA is not adjusted.

The only adjustment implemented in the model is the fact that TSLRIC prices are calculated for the year 2015 instead of the year 2009.

1.1.5 New Zealand

While the draft UCLL price in New Zealand was NZD 28.22, the new draft estimates (after having reviewed interested parties comments and updated the model accordingly) are:

Table 4 – New draft UCLL price estimates

	2016	2017	2018	2019	2020
UCLL price	26.74	27.18	27.63	28.09	28.56

Source: Commerce Commission

To facilitate comparison with other countries, the UCLL price estimate for the year 2015 has been considered. It is equal to NZD 26.31.

However, this draft UCLL price needs to be modified to be on a pro forma basis:

- TSO areas and post 2001 subdivisions need to be included,
- Lead-in/ Final drop costs need to be fully included,
- The model has to be a copper model and not a FTTH+FWA model.

1.2 Reconciliation

As explained above, the benchmark of UCLL costs per line needs to be performed on a pro forma basis:

- National coverage (not limited to TSO areas or equivalent);
- Same scope of costs (from exchanges to premises, excluding external termination point, but including final drop);
- Same depreciation formula;
- Same year of calculation, modelled investments being forecasted in 2015 when necessary. Indeed, because TSLRIC models depreciate investments on the basis of the tilted annuity, resulting UCLL costs per line and per month change every year. It is therefore necessary to consider a single year for comparison.

Financial parameters, unit prices and infrastructure sharing have not been aligned. They are however analysed in the following sections.

In summary:

- **New Zealand**: scope of costs has been extended to final drop infrastructures, and scope of lines extended to non-TSO and post-2001 lines. Also the copper configuration has been used instead of the FTTH+FWA configuration;
- **France**: the depreciation formula has been switched to a tilted annuity depreciation method, and annual costs forecasted from 2002 to 2015 thanks to asset price trends published by ARCEP in 2005;
- **Ireland**: the Irish model is not available and therefore cannot be further included in the analysis. However an estimate of the national average cost is provided.
- **Denmark**: no change.
- **Sweden**: annual costs have been forecasted from 2010 to 2015 using asset price specific to Sweden.

While sometimes complex to implement, these changes are necessary to conduct an in-depth comparative analysis of the UCLL price in these countries.

The table below summarizes existing UCLL prices and national average UCLL costs considered in the rest of the report:

Table 5 – Current UCLL price and national average cost of UCLL used in the remaining of the report to compare countries together

NZD/line/month	Current UCLL price	National average cost of UCLL
New Zealand	26.31	38.13
Ireland	17.93	[44-51][10]
Denmark	12.75	12.75
Sweden	16.09	17.26
France	14.93	23.82

Source: TERA Consultants

It is to be noted that while the gap with Denmark and Sweden increases when using a national average of UCLL, the gap is reduced with France (60% difference instead of 76%). New Zealand becomes less expensive than in Ireland.

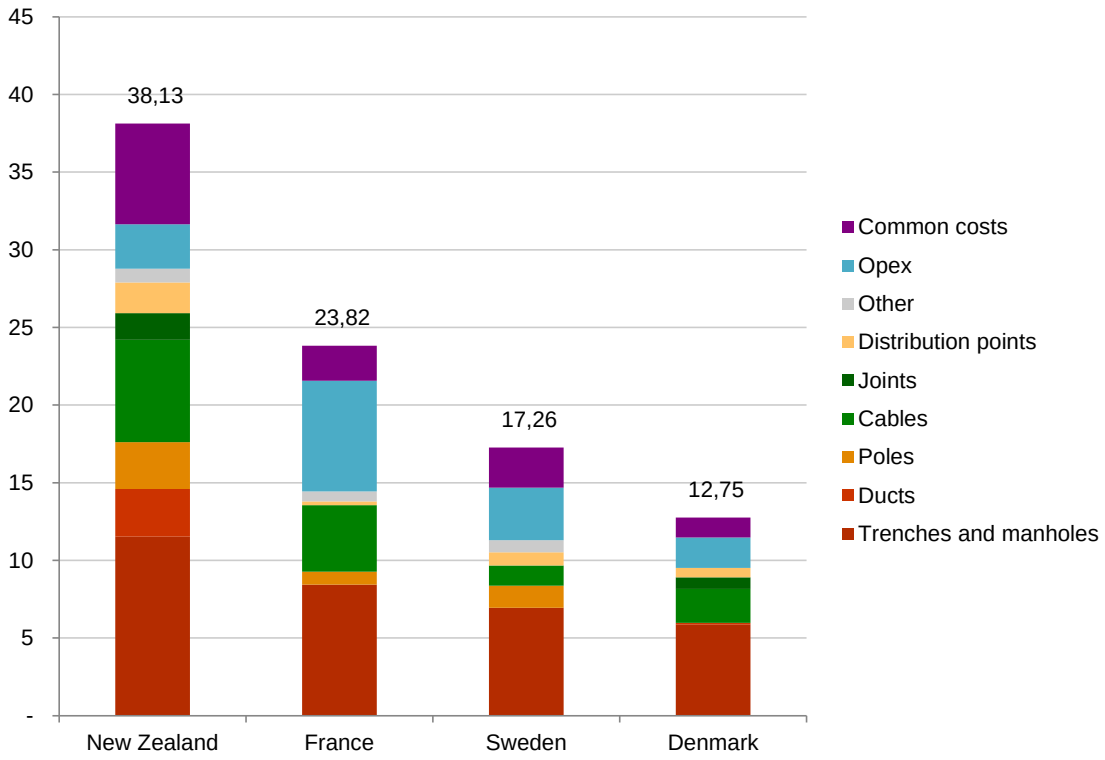
[10] Range based on the publicly available scope of the price modeled in 2010 and extrapolated thanks to the distribution of costs in New Zealand and Denmark (see Appendix).

2 Benchmark

2.1 UCLL cost breakdown

UCLL national average costs can be broken down into annualised CAPEX, OPEX and common costs thanks to the amount of information that has been collected. In addition, TERA Consultants' review of the TSLRIC models has enabled to further detail the components of the annualised CAPEX which are mainly made of cables, trenches and poles. They are visible in the figure below.

Figure 2 - Breakdown of unit costs per month (NZD, 2015)



Source: TERA Consultants

NB: the total cost in each country is equal to the right column of Table 5~~Table 5~~ above.

Several high level analyses can be made from this diagram.

About infrastructure costs (trenches, ducts and poles):

The level of UCLL prices is mainly driven by:

- Network length per user and other geographical features;
- Trenching and cables unit costs;
- Depreciation factor (higher WACC and lower price trends result in higher costs).

In the four selected countries, the major component of UCLL costs is underground infrastructure. As underground infrastructure costs are recovered over a long asset life (from 30 to 50 years), they represent an even greater share of access network investment.

Trenches and ducts are not necessarily well dissociated in the four selected UCLL models. For that reason, both underground infrastructures are represented with similar colors in Figure 2.

Poles represent a high cost in countries with a large share of aerial network. However, poles benefit most of the times of heterogeneous sharing with electricity utilities which drives down the costs of poles in UCLL and prevents an accurate comparison to be made.

About cables and joints

Cables and joints represent an important share of UCLL costs. It is relevant to treat them altogether since sometimes joint costs are partly or fully included in cable costs, the quantity and cost of each being driven by the deployment rules selected for the deployment environment taking into account of factors such as population density and climate. Their price trends are usually volatile as they depend on commodity markets and technological progress: they are then very sensitive to the year of modeling, when their price trend is assessed.

At total, the annualized costs of cables and joints are hardly comparable among the four selected countries. There is however some kind of relationship between infrastructure costs and cable costs:

- cables and joints costs are higher in France compared to Denmark and Sweden and infrastructure costs are also higher;
- cables and joints costs are lower in France compared to New Zealand and infrastructure costs are also lower.

This relationship is obviously explained by the fact that the longer the network infrastructure is, the longer cables are too. Additionally this will contribute to more joints being required.

It is important to note that the cost of distribution points in New Zealand is much greater than in other countries. This may be explained by the lower population density and the greater number of single dwelling premises in New Zealand relative to other countries both of which lead to a higher distribution point per premise ratio and thereby higher relative costs.

About OPEX and common costs

The cumulated amount of OPEX and common costs is consistent within the four selected countries: between NZD 7 and NZD 10 per line and per month, except for Denmark. Assessing OPEX and common costs separately is not necessarily relevant

since differences from a country to another can be explained by differences in cost categorization: some costs may be labelled as common costs in some countries while they would be labelled as OPEX in other. It is however interesting to note the high share of common costs in New Zealand which could be explained by the fact that Chorus is the only non-integrated operator of the benchmark and benefits from lower economies of scope (in France, the incumbent is one of the largest operators in the world and shows a much lower level of common costs).

OPEX are higher in France as they are based on historical top down calculations without any efficiency adjustment reflecting a new network.

In Denmark, as the network is entirely buried, the number of faults is comparatively low, then the OPEX. The level of faults per line and per annum is very low in Denmark (close to 4-5%).

This first analysis enables to highlight the fact that infrastructure costs (trenches, ducts and poles) need to be analyzed into more details to understand fully cost differences from a country to another. As a consequence, the following sections analyze demographic and geospatial differences (see section 2.2), financial parameters differences (see section 2.3) and infrastructure costs differences (see section 2.4).

2.2 Demographic and geospatial metrics

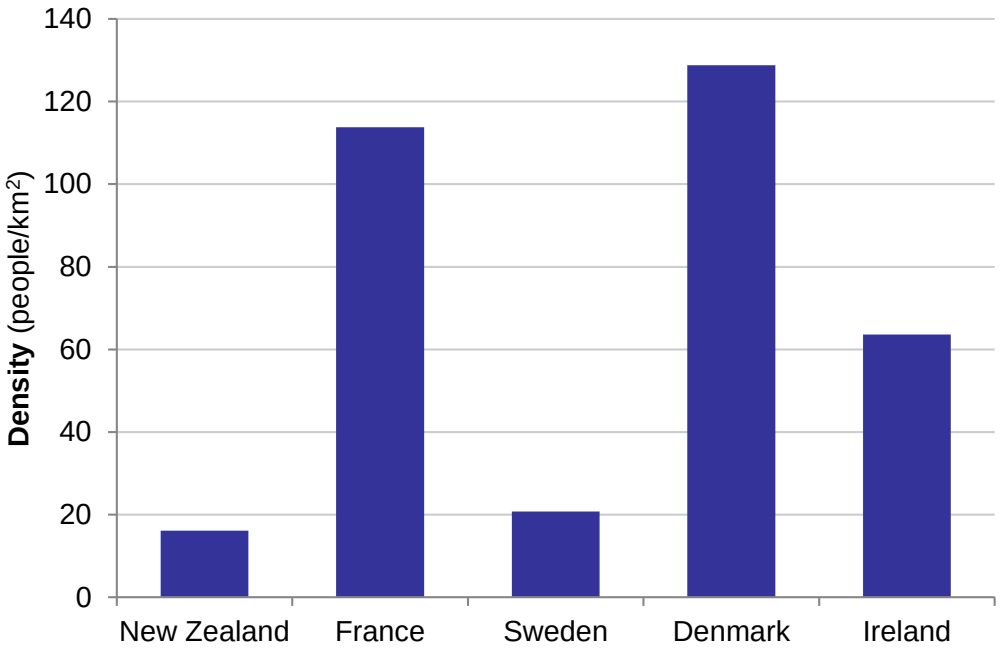
Several indicators can describe the geospatial features of the access network.

Access network costs are mainly driven by the way homes are distributed over the territory. If people live in very dense areas, the UCLL cost per line and per month is likely to be small.

As a consequence, in order to explain UCLL cost differences between a given country and another, it is intuitively necessary to use indicators like population density, share of rural and urban population, etc.

New Zealand presents a very low population density. Sweden presents a similar density.

Figure 3 – Density of population in the five selected countries



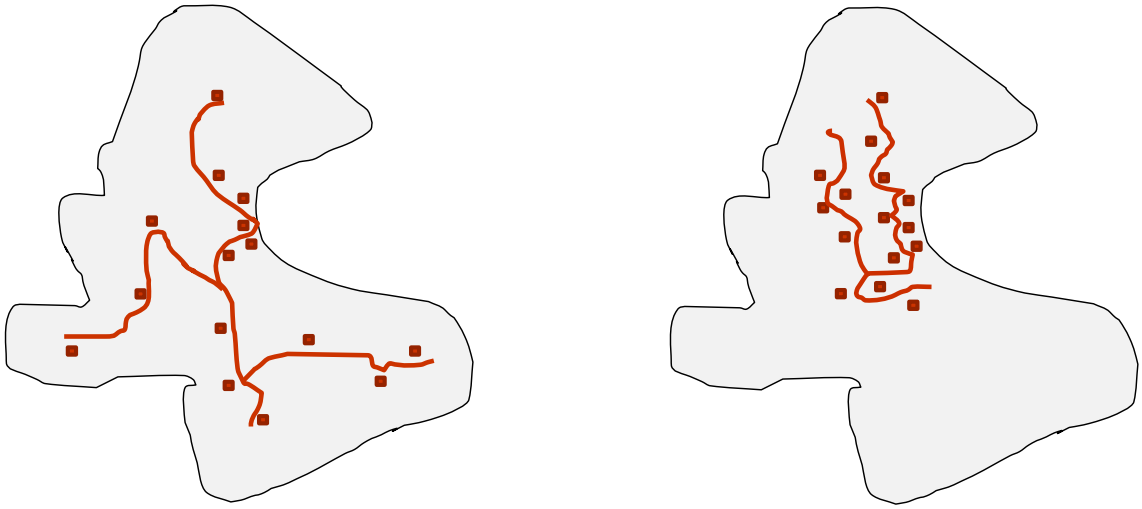
Source: UN, Dpt. For Economic and Social Affairs, 2010 data[11]

However, these indicators are not sufficiently robust in the specific case of UCLL. A more relevant indicator is the length of roads/streets per active line. This indicator is extremely relevant. This is because fixed wired access networks follow streets and roads. An even more relevant indicator is the length of infrastructure (trenches and poles) per active line. This latter indicator is better than the former as it enables to get rid of streets and roads with no home (and therefore not used by telecommunications networks). Dividing by the number of active lines enables to take into account the role of the copper network penetration rate in the UCLL cost.

For instance, two countries with the same population density can have divergent infrastructure costs thanks to differences in the distribution of buildings within the country: more polarized in one country, more homogeneous in the other. Typically, a country with large “no man’s lands” (Alpes in France, North of Sweden) could have a low population density but a distribution of homes and buildings that make access network costs low.

[11] http://esa.un.org/unpd/wpp/Excel-Data/DB02_Stock_Indicators/WPP2010_DB2_F01_TOTAL_POPULATION_BOTH_SEXES.XLS

Figure 4 – Distribution of buildings and density



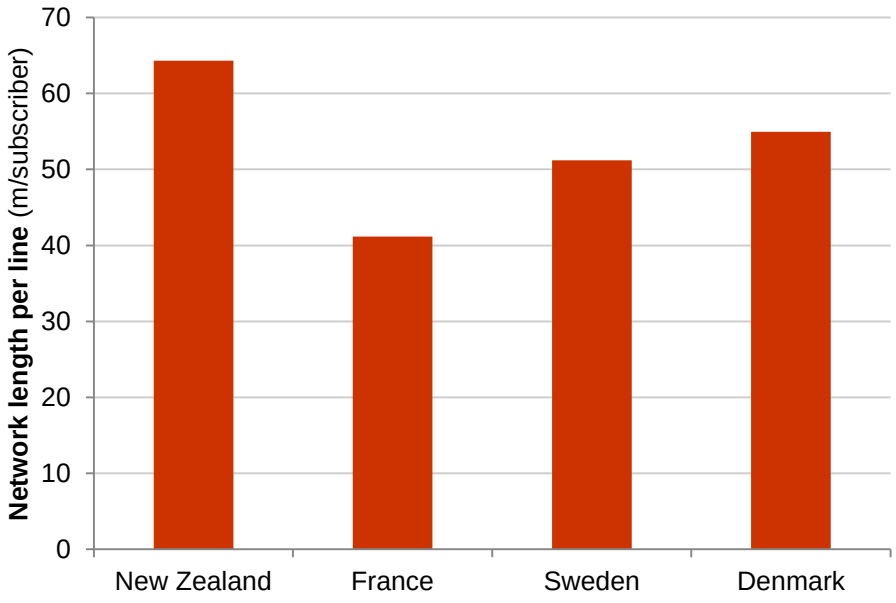
Source: TERA Consultants

The left and right countries have the same number of dwellings and the same surface. However, the left country is homogeneously distributed while the right country is rather polarized.

Thus, in Sweden, where the density is similar to New-Zealand, road network is significantly lower as compared to New Zealand, which can be due to:

- less remote buildings;
- less space between buildings in urban and rural areas;
- less single dwellings units.

Figure 5 – Network length (underground/trenches + overhead/poles) per active line[12]



Source: TERA Consultants

Length per line in New Zealand is significantly higher than in the other selected countries. Such feature results in higher infrastructure costs per line.

Plus, it also appears that cables are on average smaller in New Zealand than in France or Denmark (42 pairs/cable, vs. respectively 82 pairs and 69 pairs). This means access network cables distribute fewer dwellings in New Zealand than in Denmark and France, which is consistent with discrepancies in length per line data.

In the above figure (Figure 4~~Figure 4~~), in the left country, the operator uses more cables (more routes) but fewer pairs per cable (less dwellings to distribute on each route) than in the right country.

2.3 Financial parameters and depreciation factors

As infrastructures compose the major parts of the access costs, the WACC has almost a linear impact onto the unit cost per line.

Indeed, the tilted annuity depreciation is derived from the WACC, the price trend and the asset life according to the following formula:

[12] NB: in Sweden, the approach to derive network length is a sampling/ geotype approach while in Denmark and New Zealand network length is derived from a detailed network deployment at the national level.

$$\frac{r-\pi}{1-\left(\frac{1+\pi}{1+r}\right)^{n}}$$

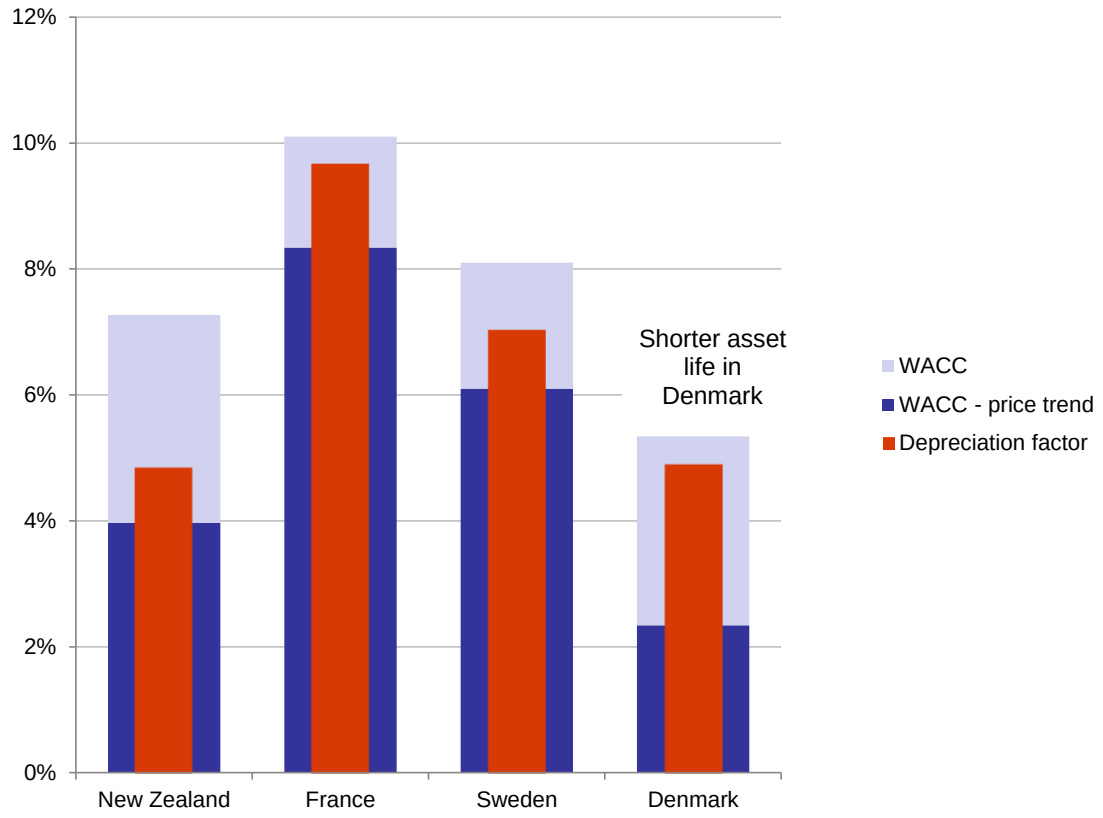
Where:

- r is the nominal pretax WACC
- π is the price trend of the modelled asset
- n its asset life

When the asset life is high (above 20 years), then the depreciation factor is mostly sensitive to the WACC r: differences in WACC result in proportional differences in depreciation factor.

For instance, using a 2 points higher WACC in New Zealand would result in a 1.8 point higher depreciation factor: in relative terms, annuity would be 37% higher.

Figure 6 – Depreciation factor for underground infrastructures



Source: TERA Consultants

It appears that New Zealand has lower depreciation factors for infrastructures than in France and Sweden, and is in line with Denmark. This would suggest a lower unit cost of UCLL (taken in isolation).

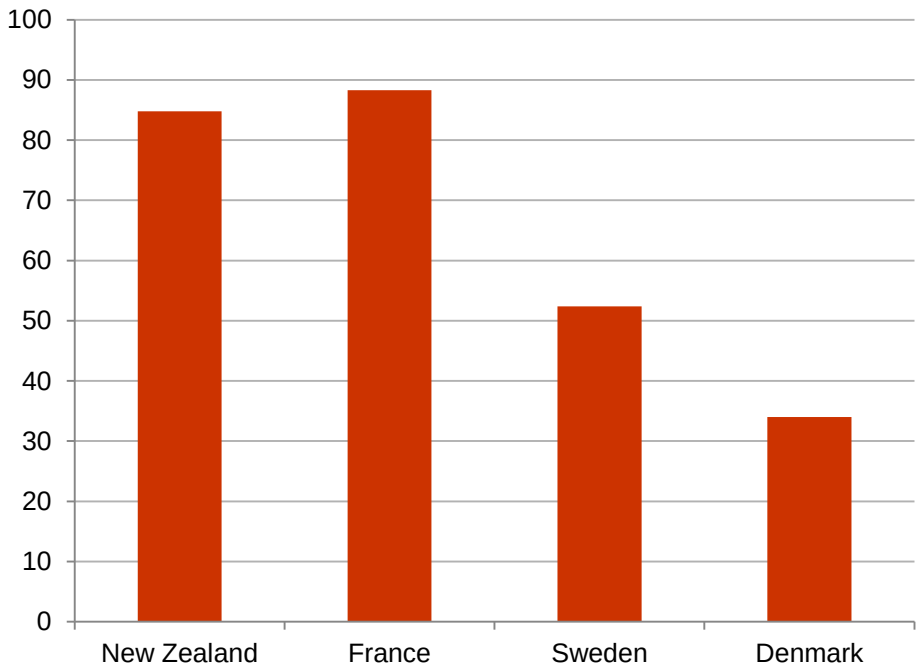
The difference in depreciation formula with France and Sweden mitigates the gap in infrastructure length and costs described in the section above. In Denmark,

depreciation factor is well above $r - \pi$ as trench asset life is significantly shorter (30 years, as compared to 40 or 50 years in the other countries).

2.4 Trenching unit costs

The cost of trenches per meter is an extremely important parameter in access network cost models for UCLL. In each country, there are different types of trenches available, different sizes, different technologies. However, TERA Consultants has been able to derive an average cost of underground infrastructure per meter (see figure below).

Figure 7 – Underground infrastructure unit costs per meter (NZD)



Source: TERA Consultants

Underground infrastructure costs (i.e. trenches, ducts and manholes) are not consistent among the four selected countries. Those costs are inferred from the total underground infrastructures investment divided by the total length of access trenches. They are referred in this report as “trenching costs”.

It appears that trenching costs are on average across the entire country significantly higher in New Zealand than in Sweden and Denmark. This is not explained by differences in wage since the 5 countries have similar levels of development. In Sweden and Denmark, low costs stem from the technology used (miniducts and direct burying in Sweden, direct burying in Denmark, i.e. no ducts).

2.5 Conclusions

The previous comparative analysis enables to understand UCLL cost differences between countries:

- UCLL prices cannot be compared directly in the five selected countries, since their scope of lines, their scope of cost items, and their financial methodology and parameters differ from one country to another.
- UCLL prices need to be adjusted to be compared on a *pro forma* basis (cf. section 1.2).
- It appears that New Zealand UCLL costs are significantly higher than in France, Sweden and Denmark but not Ireland.
- Network lengths per line in New Zealand are significantly higher than in the other three countries. Network length per line is a much better indicator than population density to understand cost differences as it captures spatial dispersion of buildings.
- Trenching unit costs are in line with France.
  Trenching unit costs are significantly lower in Denmark and Sweden thanks to trenching techniques considered (directly buried cables).
- Depreciation factor for trenches is line with Denmark but lower than in France and Sweden.
- Distribution point costs appear to be high in New Zealand which may reflect the greater number of standalone dwellings and longer line length per user in New Zealand compared with the other countries.
- OPEX and common costs are generally similar from a country to another. A high share of common costs is observed in New Zealand which may be due to the fact that Chorus is the operator with the lowest level of vertical integration in the benchmark.
- When New Zealand and France are compared together:
  - The higher level of UCLL price in New Zealand compared to France is explained by a high network length per active line, by a smaller average cable pair count and by a high share of overhead network in France (partly compensated by greater depreciation factors for trenches)
- When New Zealand and Sweden are compared together:
  - Trench unit costs are much greater in New Zealand compared to Sweden, as in Sweden, the HEO uses mini-ducts and direct burying in a large part of the trenched network.
  - Network length per customer is significantly greater in New Zealand (which is likely to be due to different building spatial dispersion).
- When New Zealand and Denmark are compared together:
  - Trench unit costs are much greater in New Zealand compared to Denmark where directly buried cables are considered
  - Network length per customer is materially greater in New Zealand (which is likely to be due to different building spatial dispersion).
  - OPEX are very low because the network is fully underground.

Table 6- Synthesis of key metrics driving UCLL costs

	New Zealand	France	Sweden	Denmark
Active lines (million)	**1.82**	32.80	4.57	2.59
Cost per line (NZD/month)	**38.13**	23.82	17.26	12.75
% aerial	**46%**	67%	[ ][13]	0%
Network length per line (m)	**64.3**	41.2	51.2	55.0
Density (people/km^2)	**15**	112	20	126
Depreciation factor for trenches	**4.8%**	9.7%	7.0%	4.9%
Average trenching cost (investment – NZD/meter)	**85**	88	52	34

Source: TERA Consultants

[13] Data not available.

3 Focus on Dublin and Auckland

In this section, network costs and topologies of Dublin and Auckland are compared. This analysis is conducted because it is observed that UCLL urban costs in New Zealand remain high. Comparing Dublin (only city where data is available to us outside New Zealand) and Auckland can provide some insights about the level of urban costs in New Zealand

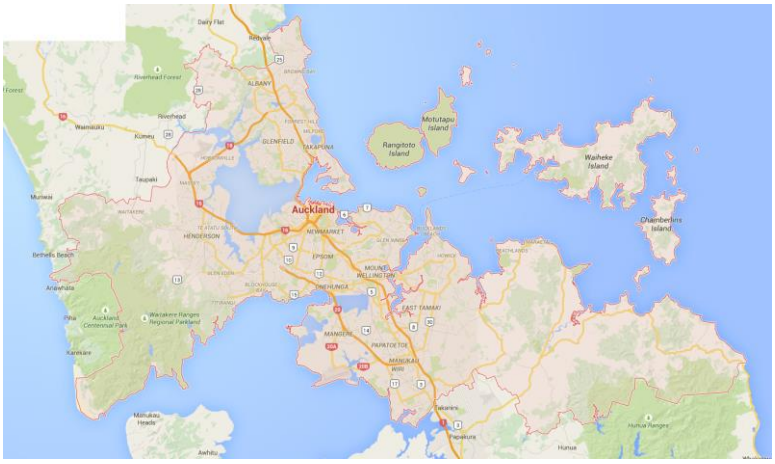
The Dublin region and the Auckland municipality have been considered (see maps below).

Table 7 – Auckland and Dublin demographics

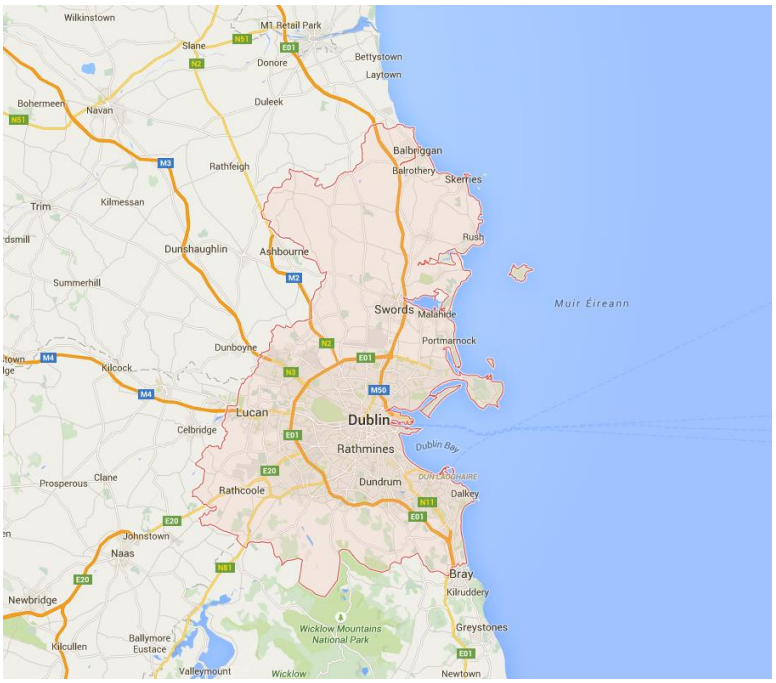
	Surface (km^2)	Dwellings	Active lines
Auckland	1,086,000	488,385	446,269
Dublin	264,700	883,540	400,000 to 500,000[14]

Source: TERA Consultants

Figure 8 – Auckland and Dublin borders



[14] Assuming a 1 line for 2 dwelling assumption (close to national figures)



Source: Google Maps

The cost per line in Auckland (98% urban) is consistent with New Zealand urban cost per line (NZD 22)[15]. The cost per line in Dublin is not publicly available but assuming it is in line with the cost of areas which are unbundled by alternative operators in Ireland, the cost would be equal to around NZD 18 per line and per month (see section 1.1.2).

There are major discrepancies in city geographical features.

Table 8 – Auckland and Dublin geographical features

	Density (dwellings/km^2)	**Network length per line** (m)	**Dwellings per building**
Auckland	450	27.0	1.2
Dublin	3,338	Not available	2.2

Source: TERA Consultants

First, Dublin is more densely populated than Auckland.

Thirdly, it appears that Auckland has many spaced single dwelling units, which results in an average 1.2 dwellings per building, almost twice as small as in Dublin.

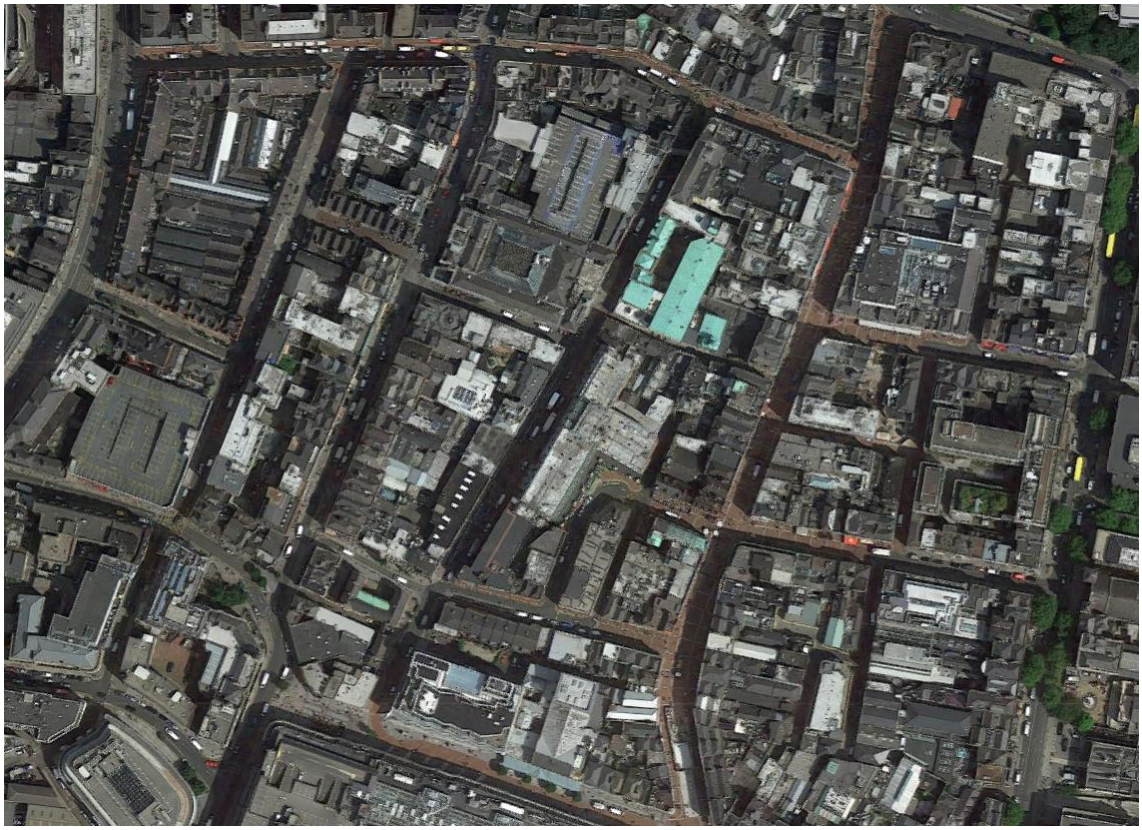
This occurs even near Central Business District, as shown in the map below, focused on Francklin Road.

Central Business District had a 4,600 people/km^2 density in 2006[16], which represents only 138% of the entire Dublin urban area density.

[15] Pro forma cost per line, based on year 2015 and following scope adjustment defined in section 1.1.5.

[16] http://www.stats.govt.nz/browse_for_stats/Maps_and_geography/Geographic-areas/mapping-trends-in-the-auckland-region/population-density.aspx

Figure 9 – Dublin (Clarendon Street)



Source: Google Maps

Figure 10 – Auckland (Francklin Road, near CBD)

Source: Google Maps

4 UBA increment comparison

In the December 2014 draft determination on UCLL and UBA, the draft UBA increment price was set at NZD 10.17. The new draft estimates (after having reviewed interested parties comments and updated the model accordingly) are:

Table 9 – New draft UBA increment price estimates

	2016	2017	2018	2019	2020
UBA price increment	11.15	10.97	10.80	10.65	10.52

Source: Commerce Commission

TERA Consultants has conducted a comparison of UBA increments in the four countries identified above plus New Zealand.

To conduct this analysis, TERA Consultants had to take into account the fact that in some countries (France, Ireland), the price of UBA is made of two parts: a price per customer which do not depend on the speed or peak throughput of the customer and a price which depends on the traffic actually used. TERA Consultants has therefore used the value of 300 kbps which the assumption used in the draft UBA model in New Zealand until now. Also, several types of UBA offer can be available in each country (typically layer 2, layer 3, etc.). This is the case in Sweden and Denmark. We have always selected the UBA offer of the lowest level in order to be comparable with New Zealand.

The comparative analysis shows that the TSLRIC cost of the UBA increment calculated in New Zealand is lower to the UBA prices observed in France and Ireland but higher than the prices in Sweden and Denmark.

Table 10 – Comparison of the draft UBA increment price and of the UBA prices published in selected countries

	New Zealand[17]	France[18]	Ireland[19]	Sweden[20]	Denmark[21]
Price per port and per month	NZD 11.35	€5.40	€4.90	SEK 32.00	DKK 7.08
Price per Mbps		€7.00/	€4.14		

[17] Pro forma cost per line, based on year 2015 and following scope adjustment defined in section 1.1.5.

[18] http://www.orange.com/fr/content/download/3657/33601/version/25/file/OdR%20DSL%20grand%20public_2015-01-01.pdf See prices of the DSL Collect IP product

[19] http://www.eircomwholesale.ie/WorkArea/DownloadAsset.aspx?id=2317 See prices for the 8 Mbps offer @ 300kbps

[20] http://www.pts.se/upload/Beslut/Telefoni/2009/hybrid-model-cost-results-of-lric-v7-1-091126.pdf. The actual is SEK 64 but this includes SEK32 corresponding to the local loop (shared access)

[21] https://circabc.europa.eu/sd/a/bcf477e2-870b-4d57-a192-218ff99e3c49/DK-2014-1665%20ADOPTED_EN.pdf

and per month at peak hour		Mbps	/customer		
Total price per month @300 kbps in local currency	NZD 11.35	€7.50	€9.04	SEK 32.00	DKK 7.08
Total price per month @300 kbps in NZD	NZD 11.35	NZD 12.37	NZD 14.91	NZD 5.72	NZD 1.56

Source: TERA Consultants

This comparison shows that contrary to UCLL, the draft UBA increment price is more in line with other countries. It is important to note that comparison of UBA costs from a country to another is almost impossible at a detailed level because too many parameters influence the level of costs:

- Economies of scope,
- Traffic for each service,
- Asset lives,
- WACC and price trends,
- Method of allocating costs,
- Topology of the network,
- Economies of scale,
- Size of the operator,
- Development of LLU,
- Amount of IPTV,
- Etc.

TERA Consultants would note for example that IPTV traffic can be very significant into core networks and therefore, countries where the incumbent's core network supports IPTV (which is not the case in New Zealand but is the case in Denmark for example) and where the capacity based allocation approach is used would allocate lots of costs to IPTV and less costs to UBA resulting in smaller UBA increment costs.

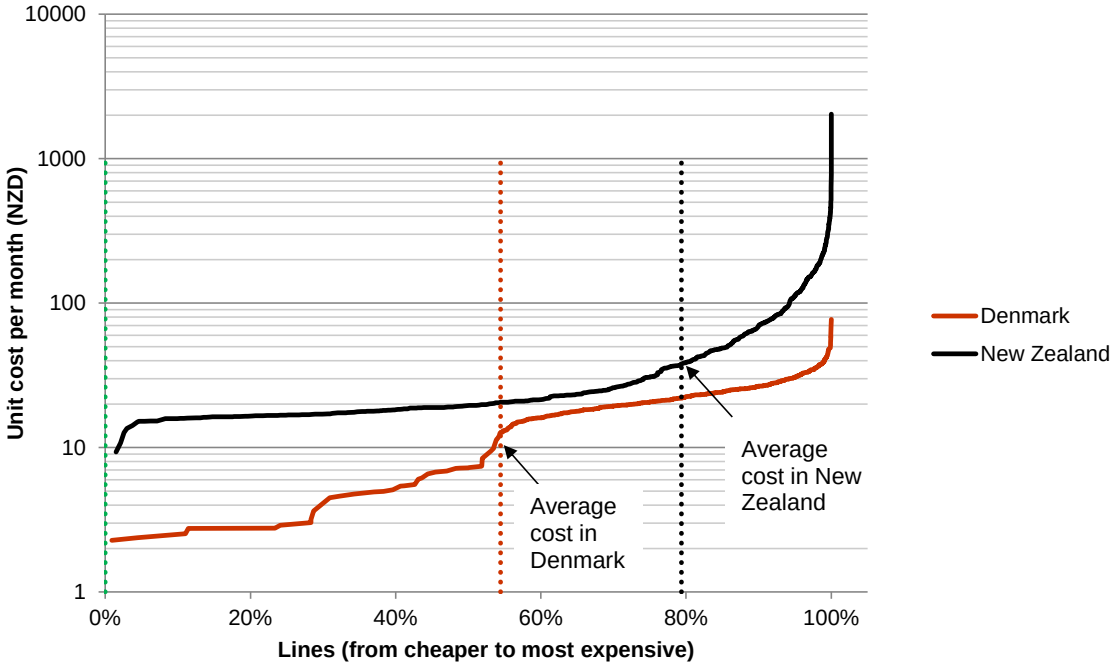
5 Appendix: cost distribution in New Zealand and Denmark

In New Zealand and Denmark, exchanges areas can be sorted from the cheapest to the most expensive. Indeed, the TSLRIC cost models in these two countries provide the cost of UCLL for each exchange.

Costs are more uniformly distributed in Denmark, hence average cost in Denmark is close to median cost.

In New Zealand, most remote areas are an order of magnitude higher than median costs, then drive average costs upwards. Hence, average costs in New Zealand is around the 80th percentile.

Figure 11 – Cost distribution (unit cost per month), from cheapest to most expensive exchanges



Source: TERA Consultants

In Ireland, 2010 UCLL prices are based on the costs of lines covered by exchanges with more than 2,500 lines, which correspond to circa. 62% of lines[22].

From the cost distribution supra, the average cost for the first 62% lines can be assessed for New Zealand and Denmark:

[22] Exchanges with more than 1,600 lines represent 68% of lines (decision D01/10 referred in Table 1). Plus, 50 MDF connect between 1,600 and 2,500 lines, according to document 09/62 (Commission for Communications Regulation, *Further Input to Consultation Document No. 09/39 on Local Loop Unbundling ('LLU') and Sub Loop Unbundling ('SLU') Monthly Rental Charges*, 27 July 2009). Assuming they connect an average 2,000 lines, out of 1,600,000 lines implies they connect 6% of lines, hence exchanges with more than 2,500 lines connect 62% of lines.

- Using the New Zealand cost distribution, the average cost for the first 62% lines would be equal to 50% of the national average cost;
- Using the Ireland cost distribution, the average cost for the first 62% lines would be equal to 50% of the national average cost;

Hence, in Ireland, the national price ranges from twice to 2.3 times the narrowed-to-first-62% price (1/50% and 1/44%)

Finally, as the Irish €12.41 price was set for the period 2010-2012, it is necessary to inflate it to 2015, assuming 2% inflation rate (European Central Bank target).

In the end, the 2015 national UCLL price is likely to range between NZD 44 and NZD in Ireland.

6 Tables and figures