Final report for Optus

# ULLS: benchmarking study

## Reviewing the ACCC draft decision

CONFIDENTIAL

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NETWORK STRATEGIES
• Telecommunications Strategy •

# 0 Executive summary

The role of international benchmarking is recognised to be an important element in price determinations. As noted by the ACCC:

> When assessing the level of cost or price of providing telecommunications services in Australia, it is prudent to conduct an international comparison to gauge the competitiveness of the Australian price of the service. The ACCC considers that international benchmarking provides an indication as to whether the prices being proposed in Australia are within reasonable bounds set by international experience and practice.[1]

Network Strategies has performed a benchmark analysis of unbundled local loop rates, with the objective of comparing the benchmark rates with the indicative prices released by the ACCC[2] and with the results from the Analysys fixed network cost model[3], commissioned by the ACCC to inform the estimation of the cost of providing declared fixed line services.

Our approach had two main components:

- a comparison of geographically de-averaged unbundled local loop prices in Canada with the geotype-level results of the Analysys model

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1 Australian Competition and Consumer Commission (2009) *Draft pricing principles and indicative prices for LCS, WLR, PSTN OTA ULLS, LSS*, August 2009.

2 Australian Competition and Consumer Commission (2009) *Draft pricing principles and indicative prices for LCS, WLR, PSTN OTA ULLS, LSS*, August 2009.

3 Analysys (2009) *Fixed LRIC model documentation – Version 2.0*, model documentation for the ACCC, August 2009.

- development of a statistical model of national unbundled local loop prices which adjusts for key factors that are found to have an influence on cost-based rates.

Despite the Canadian prices not being based on a LRIC-type methodology, but on actual costs, the Analysys model results were in general much higher than the Canadian prices, especially for rural areas. Indeed the model results for the most expensive geotypes (12–14) were higher than the Canadian prices for remote exchange areas and exchange areas which had no year-round road access.

Our benchmark model was based on a sample of European countries, with explanatory variables encompassing land area, urbanisation, the proportion of the incumbent's lines that are unbundled, and a dummy variable to indicate if a LRIC pricing principle was used. We found that our benchmark model gave results that were lower than the results from the Analysys model.

While the confidence intervals for our benchmark model results are relatively wide, it still suggests that in comparison with European rates, the Analysys model results are high. We acknowledge that there could well be valid grounds for this difference – while the model does provide a good fit to the data, it does not explain all the variation within the benchmark sample, and it is therefore possible that there may be some characteristics unique to Australia that our model has not been able to capture.

Nonetheless, with these two very different comparative analyses providing similar findings, in our opinion there is firm evidence that the results from the Analysys fixed network cost model are high in comparison with European and Canadian cost-based unbundled local loop prices.

# ULLS: benchmarking study

Final report for Optus

## Contents

# 1 Introduction

## 1.1 Study context

On behalf of Optus, Network Strategies has performed a benchmark analysis of unbundled local loop rates, with the objective of comparing the benchmark rates with the indicative prices released by the Australian Competition and Consumer Commission[4] (ACCC).

These indicative prices were based on the results from the Analysys fixed network cost model[5] ("Analysys model"), commissioned by the ACCC to inform the estimation of the cost of providing declared fixed line services.

Our analysis also compares the results from the Analysys model with the benchmark data and is based on an extended version of the sample used by Ovum in its ULLS benchmarking study for the ACCC[6].

Although the ACCC's review encompasses various fixed line services – including wholesale line rental (WLR), line sharing service (LSS), local carriage service (LCS) and PSTN originating and terminating access services (PSTN OTA) – in this report we have focussed only on the unconditioned local loop service (ULLS).

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4 Australian Competition and Consumer Commission (2009) *Draft pricing principles and indicative prices for LCS, WLR, PSTN OTA ULLS, LSS*, August 2009.

5 Analysys (2009) *Fixed LRIC model documentation – Version 2.0*, model documentation for the ACCC, August 2009.

6 Ovum (2009) *Telstra ULLS Undertaking – ULLS International Benchmarking*, 26 February 2009.

This study was commissioned by Optus, however the views expressed within this report are entirely those of Network Strategies.

## 1.2 Structure of the report

There are five main sections within this report, covering the following topics:

- describing the sample of countries selected for our benchmark analysis (Section 2)
- comparing geographically de-averaged rates in Canada with those estimated by the Analysys model (Section 3)
- reviewing the unbundled local loop rates within our benchmark sample (Section 4)
- adjusting benchmarks to take into account local characteristics (Section 5)
- conclusions from our analysis (Section 6).

Exchange rates used for currency conversion are contained within the Annex to this report.

# 2 Selecting a benchmark sample

A key issue in any benchmarking exercise is choice of countries. It is essential to select appropriate jurisdictions against which Australia could be justifiably benchmarked.

The overarching principle is to select a sample based on characteristics that have a material effect on the prices for unbundled local loops.

We considered a number of criteria in choosing appropriate countries or regions for benchmarking. The first consideration was the availability of unbundled local loop pricing data and with it the availability of comprehensive information on the methodologies employed in deriving that data. Other issues we considered related to demographic, geographic and economic factors.

Our sample includes most of the countries within the earlier Ovum benchmarking study, plus some additional countries, as shown in Exhibit 2.1. We omitted Finland as access is provided by a large number of local operating companies, the incumbent operator (TeliaSonera) not delivering a nationwide service. Other countries – Belgium, Hungary, Ireland, Norway, Portugal, Romania and Switzerland – were added as our benchmarking methodology (described in Section 5) required a sample size larger than that used by Ovum to develop a suitable model.

| *Country* | *Included within Ovum study* | *Included within Network Strategies study* |
|---|---|---|
| Austria | ✓ | ✓ |
| Belgium | | ✓ |
| Canada | | ✓ |
| Denmark | ✓ | ✓ |
| Finland | ✓ | |
| France | ✓ | ✓ |
| Germany | ✓ | ✓ |
| Hungary | | ✓ |
| Ireland | | ✓ |
| Italy | ✓ | ✓ |
| Netherlands | ✓ | ✓ |
| Norway | | ✓ |
| Portugal | | ✓ |
| Romania | | ✓ |
| Spain | ✓ | ✓ |
| Sweden | ✓ | ✓ |
| Switzerland | | ✓ |
| United Kingdom | ✓ | ✓ |

***Exhibit 2.1**: Countries included within the benchmark samples [Source: Ovum, Network Strategies]*

Our benchmark methodology uses the statistical technique of multiple regression to identify a mathematical relationship that will express the cost-based price of a jurisdiction's unbundled local loop in terms of a function of a number of explanatory or predictor variables. The methodology requires input data on price and the explanatory variables for a sample of observations (the benchmark sample). Ideally, the number of explanatory variables should be no more than one quarter of the number of observations in the benchmark sample[7]. So, if we wished to use four explanatory variables within our model, then a sample of at least 16 countries is required.

7 Chatfield, C. (1988) *Problem solving: a statistician's guide*, Chapman and Hall, London.

However, it will be noted that the countries added to our sample are dissimilar to Australia in terms of a number of characteristics. Should we have attempted to find countries more similar to Australia? The statistical technique that we use for our modelling seeks to identify and quantify variation within the data – in other words, establishing the factors that result in differences in price. If we chose our benchmark sample such that there is little variation within the data – namely, that the values of all the explanatory variables are very similar – then we are left with no factor which could then be able to explain why there may be differences in the prices in different jurisdictions.

Thus our objective with selection of the benchmark sample is to include countries with varying characteristics, so that we can clearly identify the factors that influence price.

There is one further requirement for our benchmark sample: ideally the values of the explanatory variables for the country to be estimated (Australia) should not be outliers with respect to those of the benchmark sample. An outlier is defined to be an extreme value – as an example, if explanatory variable $Z$ had values between 10 and 50 for our benchmark sample, Australia would be an outlier if its value of $Z$ was beyond this range. In this instance we can still use our model to extrapolate prices, however the model results will be less reliable than if the value for $Z$ was not an outlier.

We have considered Canada as a special case (discussed in Section 3). It has a number of geographic and demographic characteristics that are relatively similar to Australia – such as a large land area and low population density. Furthermore, it has implemented geographically de-averaged rates for unbundled local loops.

Previous studies conducted on behalf of the ACCC (the Ovum study[8]) and Telstra (the ICN report[9]) have considered various factors that may have an influence on unbundled local loop prices, including:

- regulatory framework
- population density

8 Ovum (2009) *Telstra ULLS Undertaking – ULLS International Benchmarking*, 26 February 2009.

9 Ingenious Consulting Network (2008) *Commentary on the use of international benchmarking in setting interconnection rates*, December 2008.

- mix of housing types / land use
- loop length
- pricing structure.

In this section, we discuss some of these characteristics of our benchmark sample and consider how those countries compare with Australia.

## 2.1 Regulatory pricing principles

Different regulatory frameworks and regulatory pricing principles have been implemented across our benchmark sample (Exhibit 2.2).

| | *FAC/FDC/EDC* | *Benchmark* | *Retail-minus* | *Price cap* | *LRIC* |
|---|---|---|---|---|---|
| Australia | | | | | ✓ |
| Austria | | | | | ✓ |
| Belgium | | | | | ✓ |
| Canada | ✓ | | | | |
| Denmark | | | | | ✓ |
| France | | | | | ✓ |
| Germany | | | | | ✓ |
| Hungary | | | | | ✓ |
| Ireland[10] | | ✓ | | | |
| Italy | ✓ | | | | |
| Netherlands | ✓ | | | | |
| Norway | | | | ✓ | |
| Portugal | ✓ | | | | |
| Romania | | | ✓ | | |
| Spain | ✓ | | | | |
| Sweden | | | | | ✓ |
| Switzerland | | | | | ✓ |
| United Kingdom | ✓ | | | | |

***Exhibit 2.2:*** *Regulatory pricing principles for unbundled local loop [Source: regulators, Ovum, European Commission]*

Prices based on a LRIC-type methodology are generally recognised to be lower than if they were to be based on FAC/FDC methods. The latter, by definition, achieves cost recovery, however LRIC is based on the hypothetical costs of an economically efficient operator, and thus a real-life operator, with some level of inefficiency, will be unable to recover costs fully. LRIC pricing therefore encourages operators to become more efficient.

Even if LRIC-based prices have been implemented, we note that there may still be substantial variation due to differing regulatory policies and assumptions – either methodological or input parameters, such as the weighted average cost of capital (WACC).

10 The Irish regulator, ComReg, has developed a bottom-up long run average incremental cost (BU-LRAIC) model to aid in the determination of unbundled local loop pricing. A consultation process for unbundled local loop concluded at the end of August 2009 and the final decision in regards to the price determination is expected to be published mid-October 2009. The Irish prices used within our analysis are the existing benchmark-based prices, which are still valid.

## 2.2 Geographic and demographic factors

Land area is often cited as a causal factor in increasing the cost of service provision in Australia. There are few countries with similar land area to Australia – Canada being one example. Indeed, European countries are one or two orders of magnitude smaller (Exhibit 2.3).

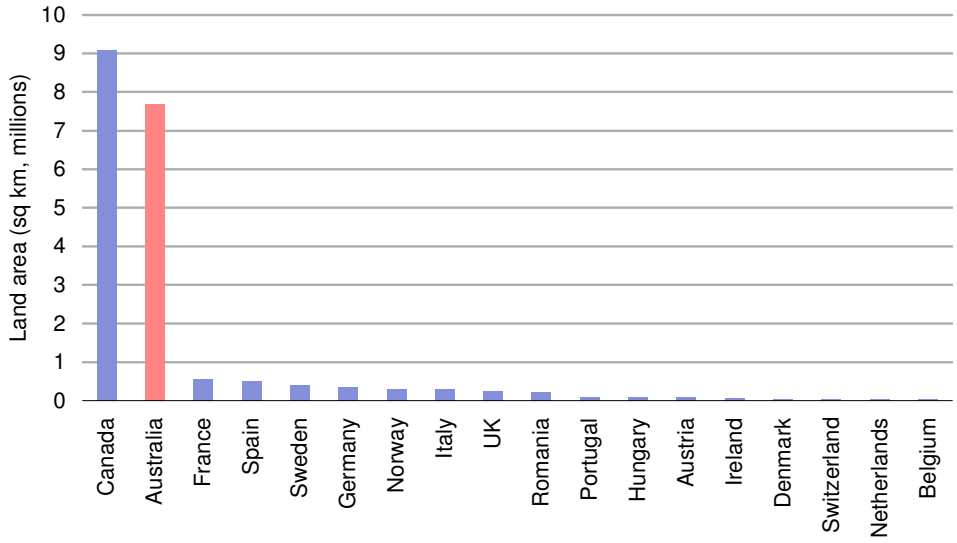



***Exhibit 2.3:*** *Land area for countries in the benchmark sample [Source: World Bank]*

In most countries, there will be areas which are unserved: in developed nations this is typically because such areas are remote or unpopulated[11]. As noted in the ICN report:

> The driver for ULL costs is population density in *served areas*, not in the country as a whole. Clearly large unpopulated areas have no impact on ULL costs, but may have a material impact on national average population density.

[11] Note that in many countries, such as Australia, there are universal service obligations which typically require the provision of residential telecoms services to all, regardless of location.

Therefore the use of the single metric of land area may be somewhat misleading as an indicator of the scope of geographic area that is being served by the incumbent operator. Telecoms services are only provided to places where there are people residing, or operating a business or other enterprise, which means there are vast areas of Australia which are unserved.

Indeed if we examine Australian land use statistics, built-up areas (including urban and rural residential, mining and airports) comprise less than 0.3% of the total land area, while minimal use areas (conservation and natural environments) comprises nearly 35%, and areas under agricultural production from relatively natural environments (grazing natural vegetation and forestry) accounts for 56% of the land area, with most of the remaining 8.5% of the country being under agricultural production[12]. Even if we allow for a somewhat broader scope than just built-up areas to denote where telecoms services are deployed, fixed telecoms services would cover only a relatively small proportion of the entire land area of Australia.

A similar situation exists elsewhere: across the countries in our sample for which land use data is available, built-up areas range from 1.4% to 18.7% of the total land area (Exhibit 2.4). Note that comparative analyses of land use statistics can be difficult due to definitional differences, and the somewhat subjective nature of land use classification (which is typically determined by a combination of environmental statistics and satellite images).

12 Bureau of Rural Sciences (2009) *Land use in Australia – at a glance.* Available from http://www.brs.gov.au.

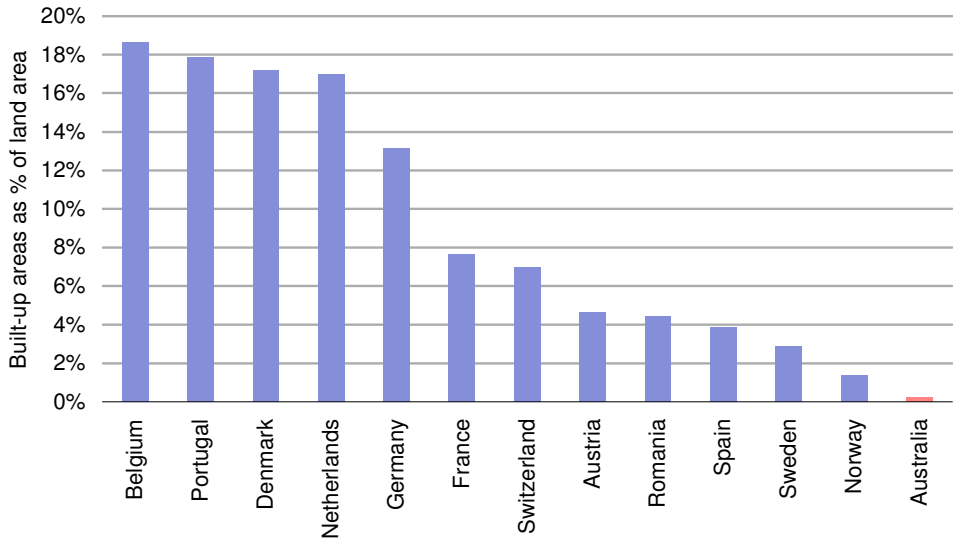



***Exhibit 2.4:*** *Built-up areas as a proportion of total land area [Source: Eurostat, Statistics Norway, Bureau of Rural Sciences]*

If we examine how these proportions translate to physical area, we find that France and Germany have more than twice the built-up area of Australia (Exhibit 2.5). It therefore appears that in terms of the suburban areas typified by the Australian Band 2 classification (discussed further in Section 3.2) Australia cannot be characterised as an outlier in comparison with our benchmark sample.

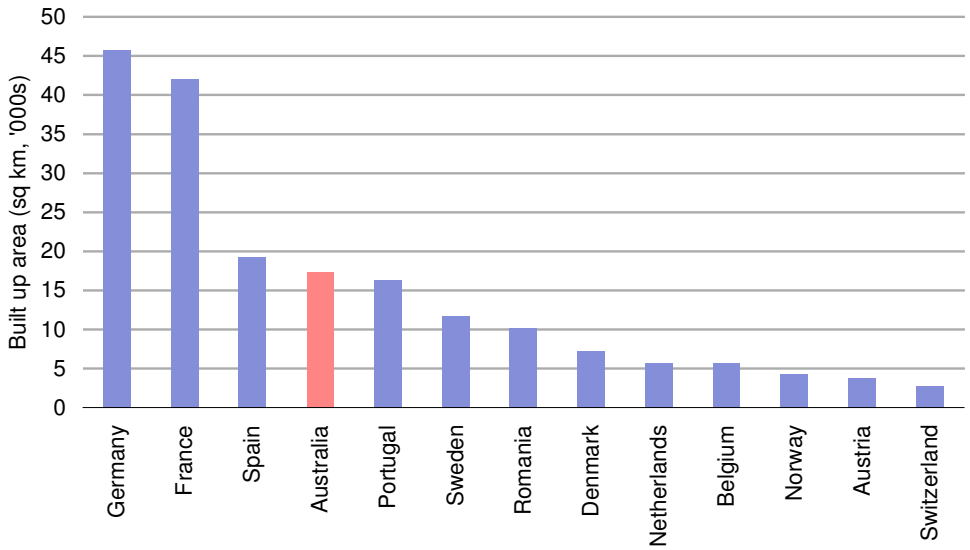



***Exhibit 2.5:*** *Built-up land area, for countries in the benchmark sample [Source: Eurostat, Statistics Norway, Bureau of Rural Sciences]*

In terms of population size, Australia is around the mid-point of our sample (Exhibit 2.6). Population is one sign that is an indicator of the size of the addressable market, and thus may reflect the relative economies of scale that could be achieved.

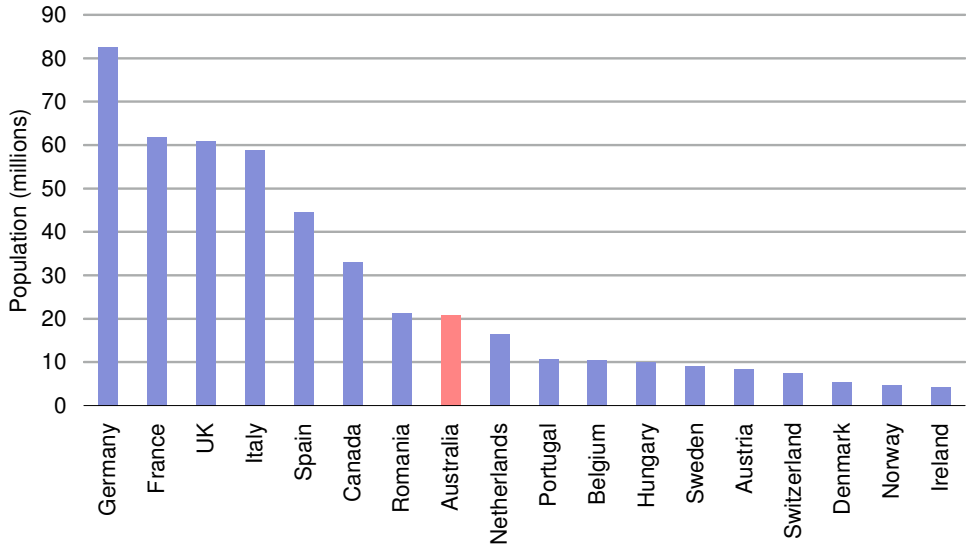



***Exhibit 2.6:*** *Population for countries in the benchmark sample, 2008 [Source: ITU]*

It is well-recognised that the cost of telecoms services is affected by population distribution. A study by the Productivity Commission[13] found that differences in population distribution between Australia and several countries and US states were an influence in the cost of providing local telephone services.

Population density is the usual measure of population distribution. However population density varies considerably within most countries, from urban to rural areas, and capturing this type of information within a model normally requires extremely low-level data. The aggregate population density at the country level does not adequately represent the true complexity of population dispersion and is of limited value in a high-level model.

With a relatively large land area and low population, Australia is one of the least densely populated nations in the world, with only 2.7 persons per $km^2$ (Exhibit 2.7). Population density in Canada is slightly higher, at 3.6 persons per $km^2$. However as discussed above,

13 Productivity Commission (2000) *Population distribution and telecommunication costs*, Staff Research Paper, August 2000.

what is important, in terms of unbundled local loop costs, is the population density in served areas.

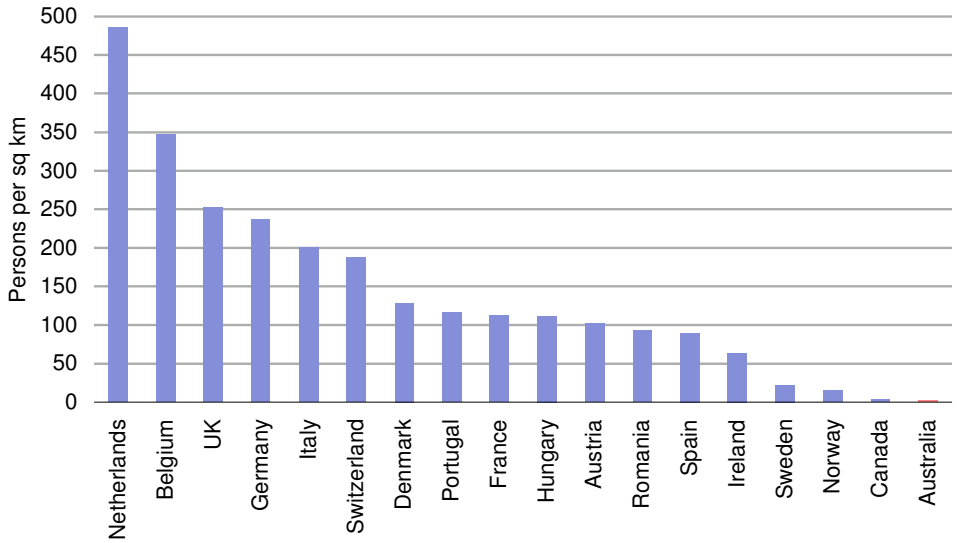



***Exhibit 2.7:*** *Population density for countries within the benchmark sample, 2008 [Source: ITU, World Bank]*

Another measure of population dispersion is the proportion of the population that live in urban areas. Due to the concentration of demand for unbundled local loops in urban areas, urbanisation is a key factor in determining average costs per line. We would expect that the more urbanised the jurisdiction the greater the economies of scale in telecoms services. It is well recognised that costs of supplying telecommunications services are higher in non-urban areas, and thus jurisdictions with a high proportion of rural customers may incur higher costs than those which deliver services to mostly urban customers. Information relating to the proportion of the population living in urban areas is readily available.

Australia is one of the most urbanised countries within our sample, with nearly 90% of the population living in urban areas (Exhibit 2.8).

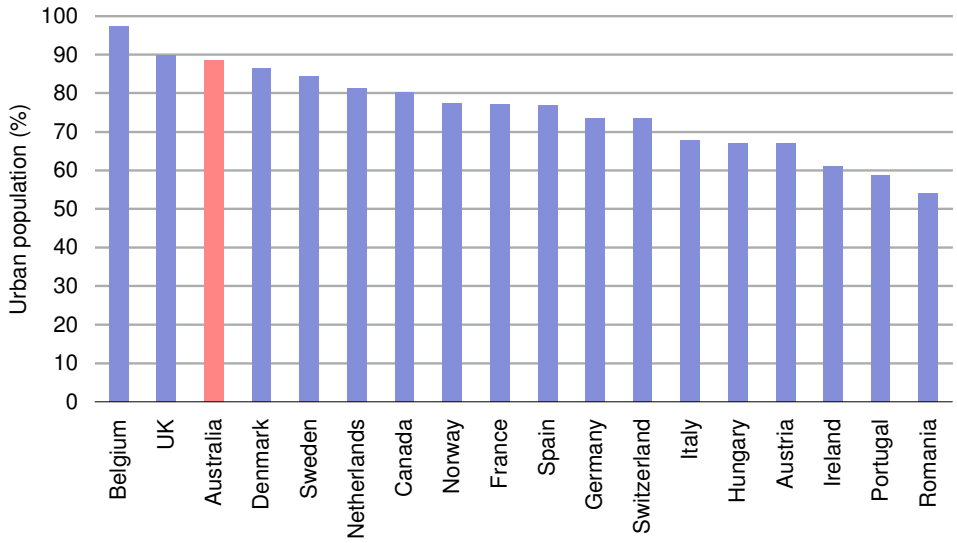



***Exhibit 2.8:*** *Proportion of the population living in urban areas for countries within the benchmark sample, 2007 [Source: World Bank]*

## 2.3 Market factors

In terms of broadband take-up, Australia is just below the mid-point of our sample (Exhibit 2.9). Broadband penetration is indicative of the relative development and maturity of the market, and the potential attractiveness of market entry for new operators.

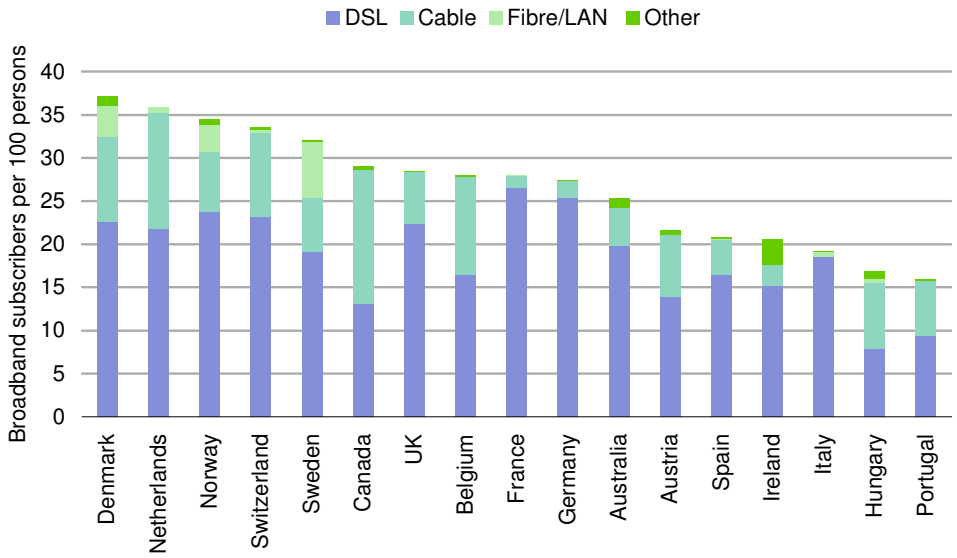
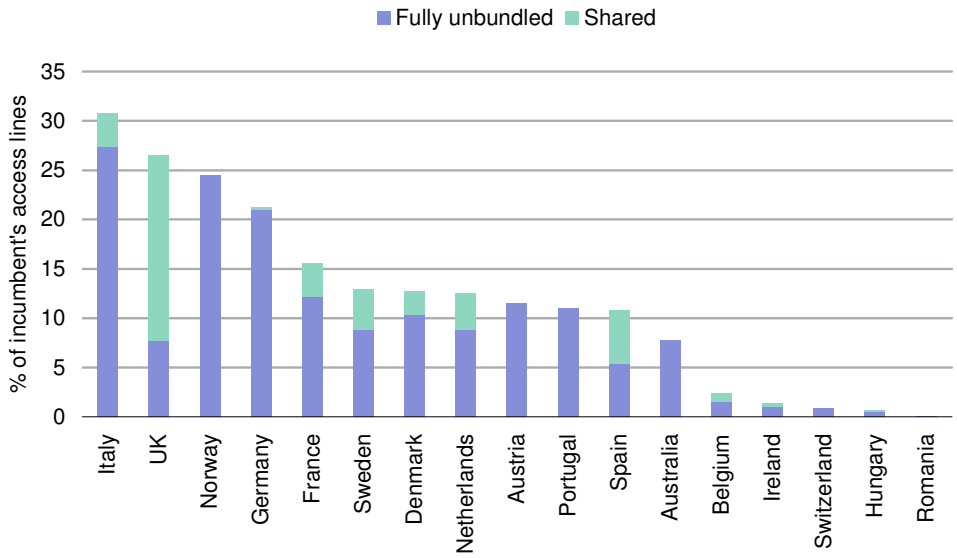



***Exhibit 2.9:*** *Broadband subscribers per 100 inhabitants for countries within the benchmark sample (December 2008) [Source: OECD]*

The proportion of an incumbent's access lines that are wholesaled is one indication of the relative size of the wholesale market and the level of competition within a country. An increased level of retail competition can encourage operators to become more efficient, and thus reduce costs. While a key principle of LRIC methodologies is that prices are based on the costs of an efficient operator, this may not be the case where prices are based on actual costs.

Wholesale includes unbundled lines, bitstream and resold lines, however information on the latter two components was not available for all the countries within our benchmark sample. Clearly, this does not provide information on the presence or absence of infrastructure-based competition, however it does reflect to some degree the level of activity in the wholesale market. In terms of unbundled lines, Australia is at the lower end of the benchmark sample, comprising just under 8% of Telstra's PSTN access lines (Exhibit 2.10).




Note: Shared lines not available separately for Australia, Norway, Portugal and Switzerland. Austria has a very small number of shared lines. Data is from1 January 2009, except for Australia (30 June 2009).

***Exhibit 2.10:*** *Unbundled lines as a percentage of incumbent PSTN access lines [Source: European Commission, Swisscom, Telenor, Telstra]*

## 2.4 Summary

As we have seen, our benchmark sample includes countries with very different characteristics from those of Australia, with these characteristics likely to have a material effect on access costs. A basic comparison of cost-based rates will not explain the differences in the tariffs, nor will it indicate how Australia should compare with the sample.

Therefore, any comparison should take those differences into account.

# 3 Australia and Canada: comparing geographically de-averaged rates

Australia and Canada are geographically large countries that share a number of similar characteristics.

- **Most of the population is concentrated in a relatively small part of the country:** The majority of the Australian population is located along the coast, in particular the coastal band from Adelaide through to south-east Queensland, while in Canada most of the population lives within 100 miles of the US border.

- **High level of urbanisation focussed on relatively few urban centres:** In Canada, 45% of the population live in the six largest urban areas (Toronto, Montreal, Vancouver, Ottawa-Gatineau, Calgary and Edmonton) and almost 70% in one of the 33 major metropolitan centres, while in Australia around two-thirds of the population live in one of the six State capital cities.

- **Remote areas with extreme climatic conditions:** Both Canada and Australia are characterised by extremely large areas that are very lightly populated, exhibit extreme climatic conditions, and are typified, in land use terms, as “minimal use” or “under agricultural production in relatively natural environments”.

- **Large variation in population densities:** In both Canada and Australia, the overall population density is extremely low, however this national figure is dominated by the large part of each country that has very low population density. In urban areas, population density is significantly higher.

- **Geographically de-averaged cost-based pricing** for unbundled local loops.

It would therefore be useful to compare unbundled local loop prices with the results from the Analysys model as a check on those results.

## 3.1 Pricing principles for unbundled local loop in Canada

Pricing for the unbundled local loop in Canada is based on actual incremental costs plus a mark-up to cover joint and common costs. It is not a LRIC methodology which is based on the costs of a hypothetically efficient operator, so we would expect the prices to be higher than if they were based on LRIC.

In Canada, as in Australia, geographically de-averaged rates are used. Exchanges are classified as belonging to one of seven rate bands. There rate bands are broadly defined in terms of the number of network access services (NAS) within the exchange:

- Rate band A – core exchanges of major urban centres – these appear to be exchanges in the "downtown" areas of major cities in the case of TELUS Alberta and SaskTel, so would be roughly equivalent to central business districts, however for TELUS BC the rate band appears to be slightly broader in scope
- Rate band B – non-core exchanges of major urban centres and exchanges of other urban areas
- Rate band C – exchanges with more than 8000 NAS
- Rate band D – exchanges with NAS between 1500 and 8000 and with a local loop length of less than 4km
- Rate band E – exchanges with less than 1500 NAS
- Rate band F – exchanges with NAS between 1500 and 8000 and with a local loop length of more than 4km
- Rate band G – remote exchanges, without year-round road access or in remote areas.

However, unlike Australia, there is no incumbent operator that offers nationwide services – there are several major regional operating companies with different footprints.

## 3.2 How do the Canadian rate bands compare with the Australian geotypes?

While it is not possible to perform a precise mapping between the Canadian rate bands and the geotypes used in the Analysys model, we are able to establish some broad relationships via the Australian rate bands, defined as:

- Band 1 – ESAs in central business districts
- Band 2 – metropolitan areas (more than 108.4 services in operation per square km)
- Band 3 – regional and rural areas (more than 6.54 SIOs per sq km)
- Band 4 – remote areas (less than 6.55 SIOs per sq km).[14]

The mapping of the geotypes to the Australian rate bands (Exhibit 3.1) allows us to make some broad conclusions:

- Canadian Rate Band A corresponds most closely to Australian Band 1 (geotypes 1 and 2)
- Canadian Rate Band B roughly corresponds to Australian Band 2 (geotypes 3–6)
- Canadian Rate Band G is likely to be comparable to the highest cost geotypes.

14 Available at http://www.accc.gov.au/content/index.phtml/itemId/853517.

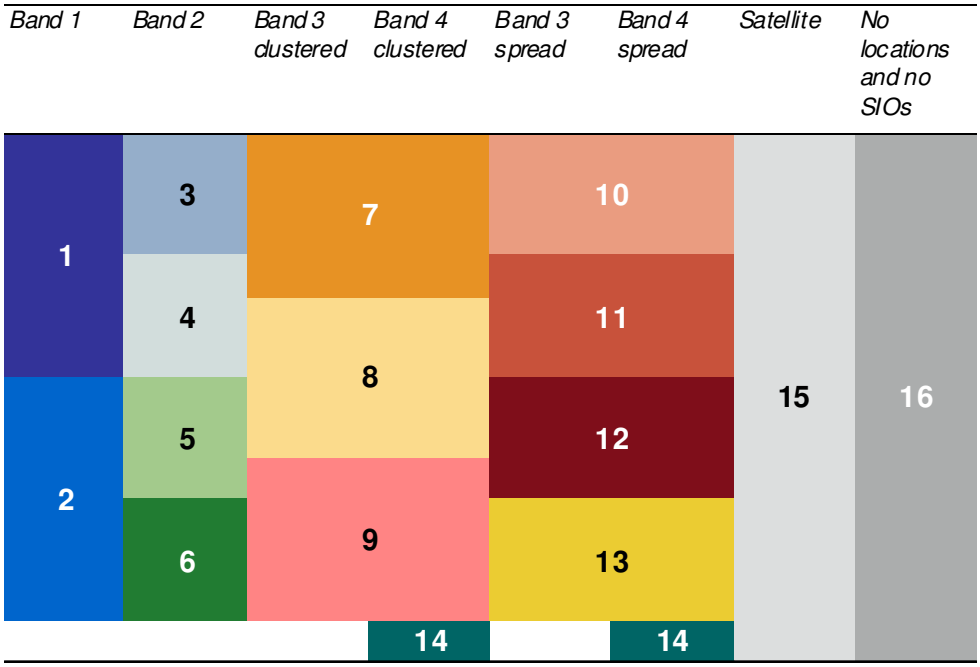



***Exhibit 3.1:*** *Diagram of geotyping [Source: Analysis]*

For the remaining geotypes, we have developed an approximate mapping based on the number of SIOs within the exchange service area (ESA) and the proportion of lines within the ESA that are more than 4km from the exchange (Exhibit 3.2). It should be noted that this mapping is not exact, as clearly there are some exchanges within the geotypes that may correspond better to an alternative Canadian Rate Band, however our classification is based on the characteristics of the majority of exchanges within the geotype.

| *Geotype* | *% ESAs with >1500 SIOs* | *% ESAs with >8000 SIOs* | *% ESAs with more than half SIOs >4km from exchange* | *Corresponding Canadian Rate Band(s)* |
|---|---|---|---|---|
| 7 | 58% | 4% | 0% | D |
| 8 | 30% | 3% | 0% | E |
| 9 | 5% | 0% | 0% | E |
| 10 | 80% | 16% | 5% | D |
| 11 | 57% | 5% | 5% | D |
| 12 | 15% | 0.1% | 14% | E |
| 13 | 0.5% | 0% | 46% | E, G |
| 14 | 0% | 0% | 75% | E, G |

***Exhibit 3.2:*** *Correspondence between geotypes and Canadian Rate Bands [Source: Network Strategies]*

## 3.3 Canadian unbundled local loop rates

We have obtained unbundled local loop rates for three incumbent Canadian operators:

- Bell Canada – main operations in the provinces of Ontario and Quebec
- TELUS – main operations in the provinces of Alberta and British Columbia
- SaskTel – main operations in the province of Saskatchewan.

The Canadian prices were converted to Australian dollars using purchasing power parity (PPP) rates.

| Geotype | Analysys model 2009 (AUD per month) | Canadian Rate Band | Local loop rental (AUD per month) | | | |
|---|---|---|---|---|---|---|
| | | | Bell Canada | TELUS Alberta | TELUS BC | SaskTel |
| 1 | 8.11 | A | 10.01 | 9.53 | 9.19 | 11.20 |
| 2 | 2.16 | A | 10.01 | 9.53 | 9.19 | 11.20 |
| 3 | 16.39 | B | 14.36 | 15.49 | 19.77 | 18.61 |
| 4 | 20.64 | B | 14.36 | 15.49 | 19.77 | 18.61 |
| 5 | 21.61 | B | 14.36 | 15.49 | 19.77 | 18.61 |
| 6 | 26.68 | B | 14.36 | 15.49 | 19.77 | 18.61 |
| 7 | 33.45 | D | 18.80 | 17.62 | 19.71 | n.a. |
| 8 | 33.02 | E | 30.41 | 31.86 | 54.22 | 51.70 |
| 9 | 36.05 | E | 30.41 | 31.86 | 54.22 | 51.70 |
| 10 | 34.75 | D | 18.80 | 17.62 | 19.71 | n.a. |
| 11 | 39.72 | D | 18.80 | 17.62 | 19.71 | n.a. |
| 12 | 54.56 | E | 30.41 | 31.86 | 54.22 | 51.70 |
| 13 | 98.52 | E | 30.41 | 31.86 | 54.22 | 51.70 |
| 14 | 64.87 | E | 30.41 | 31.86 | 54.22 | 51.70 |
| – | | C | 17.01 | 18.93 | 22.76 | 26.16 |
| – | | F | 31.09 | 26.35 | 42.13 | 43.57 |
| | | G | 52.06 | 31.11 | 56.15 | 43.06 |

***Exhibit 3.3:*** *Comparison of the ULLS results from the Analysys cost model with Canadian prices for selected operators [Source: Analysys, Network Strategies]*

It is striking to note that the Analysys model results for geotypes 12 to 14 are in general higher than prices for the Canadian Rate Band G – which applies to remote exchanges and those without year-round road access (for example many of the TELUS BC Rate Band G exchanges are located on islands).

Clearly, it would be more appropriate to compare the Canadian prices with those from groupings of geotypes, as the Canadian Rate Bands correspond to a wider range of characteristics than is seen within a single geotype. We have therefore calculated average prices (weighted by lines) over these grouped geotypes (Exhibit 3.4).

| *Geotype group* | *Average price from Analysys model 2009 (AUD per month)* | *Canadian Rate Band* | *Local loop rental (AUD per month)* | | | |
|---|---|---|---|---|---|---|
| | | | *Bell Canada* | *TELUS Alberta* | *TELUS BC* | *SaskTel* |
| 1–2 | 3.29 | A | 10.01 | 9.53 | 9.19 | 11.20 |
| 3–6 | 20.04 | B | 14.36 | 15.49 | 19.77 | 18.61 |
| 7, 10–11 | 36.44 | D | 18.80 | 17.62 | 19.71 | n.a. |
| 8–9, 12–14 | 65.05 | E | 30.41 | 31.86 | 54.22 | 51.70 |
| 13 | 94.58 | G | 52.06 | 31.11 | 56.15 | 43.06 |
| 14 | 62.27 | G | 52.06 | 31.11 | 56.15 | 43.06 |

***Exhibit 3.4:*** *Comparison of the ULLS results from grouped geotypes in the Analysys cost model with Canadian prices for selected operators [Source: Analysys, Network Strategies]*

For all except for Canadian Rate Band A, the results from the Analysys model are higher than corresponding prices in Canada. In some instances, the differences are substantial.

As we do not have information on the number of Canadian loops by band, we cannot calculate a weighted average Canadian price that corresponds to the Australian zones to compare with the zone-based average price from the Analysys model. An alternative approach is to assign the Canadian Rate Bands to the Australian geotypes (as in Exhibit 3.4), and then calculate a weighted average price using the Australian line counts as weights (Exhibit 3.5). The resultant weighted averages are lower than the zone-based average prices from the model.

| Geotype group | Average price from Analysys model 2009 (AUD per month) | Estimated weighted average local loop rental based on Canadian prices and Australian line counts (AUD per month) | | | |
|---|---|---|---|---|---|
| | | Bell Canada | TELUS Alberta | TELUS BC | SaskTel |
| Zone A (geotypes 1–10) | 21.62 | 15.14 | 15.94 | 20.22 | n.a. |
| Zone B (geotypes 11–14) | 59.39 | 26.31 | 26.83 | 42.04 | n.a. |

***Exhibit 3.5:*** *Comparison of the ULLS results by zone in the Analysys cost model with weighted average Canadian prices [Source: Analysys, Network Strategies]*

## 3.4 Summary

In our comparison of the results from the Analysys model with geographically de-averaged unbundled local loop prices in Canada, we found that for areas outside the central business district, the Analysys results were higher than Canadian rates. For some geotypes, this difference was substantial – for example the result for geotype 13 was between 68% and 204% higher than the Canadian rates for remote areas (depending on the operator).

The Australian Band 2 rate (comprising geotypes 3–6) is up to 40% higher than the Canadian rates.

Furthermore, the Canadian rates are not based on a LRIC methodology, so we would expect that the Canadian prices are higher than if LRIC was used. We can only conclude that the prices from the Analysys model appear to be overstated when compared with prices from Canada.

# 4 Basic comparisons of unbundled local loop rates

The first step in any benchmarking analysis is to perform a basic comparison of the data, to assess the level of variation within the data. In this section we present the results from such a comparison for our benchmark sample, and review two other sets of benchmarking data, from Ovum and the OECD.

## 4.1 Previous unbundled local loop benchmarking studies

*OECD*

The OECD recently published unbundled local loop charges for member countries[15], with rates valid as of the end of 2007 (Exhibit 4.1). Note that we have omitted the Hungarian rate from this chart, as the figure quoted by the OECD appears to be incorrect when compared with the 2007 price reported by the European Commission[16].

15 OECD (2009) *Communications Outlook 2009*, August 2009.

16 European Commission (2008) *Progress Report on the Single European Electronic Communications Market 2007 (13th Report)*, Commission Staff Working Document, Volume 1, 19 March 2008.

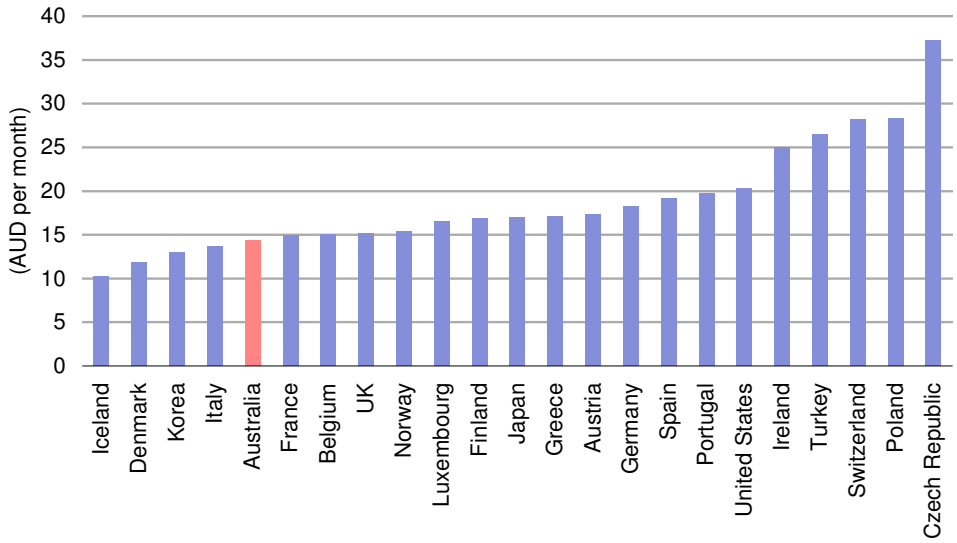



***Exhibit 4.1:*** *Local loop monthly rental for fully unbundled lines, end of 2007 (AUD – PPP) [Source: OECD]*

Note that the Australian rate quoted by the OECD is the Band 2 rate that applies in metropolitan areas outside the central business districts. This is not strictly comparable with the rates quoted by the OECD for the United States – a national weighted average – and Finland – a weighted average of 32 operators offering unbundled local loops, with prices ranging from EUR7.11 and EUR21.02 (AUD10.73 to AUD31.71). While rates in the other OECD countries apply nationally, we note that in reality most unbundling activity occurs in a relatively small number of exchanges, typically exchanges in urban and suburban areas. Geographically averaged prices would tend to reflect that tendency Ideally a weighted average Australian rate should be used in this comparison.

Secondly, the 2007 rates in a number of the OECD countries – including Hungary, Ireland, Italy, the Netherlands, Norway, Portugal, Spain and the United Kingdom – were not based on LRIC methodologies.

And finally, all the rates quoted – except for that of the United States – are nearly two years old. In the interim, some rates have gone down while others have increased (Exhibit 4.2). The price quoted for the United States is a national average as at March 2006.

| | *OECD 2007* | *September 2009* | *% change* |
|---|---|---|---|
| Australia (Band 2) | AUD14.30 | AUD16.00 | +11.9% |
| Austria | EUR10.44 | EUR6.35 | -39.2% |
| Denmark | DKK68.30 | DKK74.17 | +8.6% |
| France | EUR9.29 | EUR9.00 | -3.1% |
| Germany | EUR10.50 | EUR10.20 | -2.9% |
| Ireland | EUR16.43 | EUR16.43 | – |
| Italy | EUR7.81 | EUR8.49 | +8.7% |
| Norway | NOK95 | NOK95 | – |
| Portugal | EUR8.99 | EUR8.99 | – |
| Spain | EUR9.72 | EUR7.79 | -19.9% |
| UK | GBP6.67 | GBP7.20 | +7.9% |

***Exhibit 4.2:*** *Changes in monthly rental for fully unbundled lines from 2007 to 2009 for a selection of OECD countries [Source: OECD, operators, regulators]*

Given the amount of fluctuation in unbundled local loop rates over the past two years, the relevance of the OECD data for comparisons with proposed Australian charges for the next three years is somewhat limited.

*Ovum*

The February 2009 study[17] undertaken by Ovum on behalf of the ACCC uses rates from the second quarter of 2008, and so may now have been superseded. The time lapse is not as long as that for the OECD data, and so the changes in rates over the intervening time are less pronounced.

Ovum's study also compared ULLS prices against average retail prices. Those retail prices were for October 2007 and the ULLS prices were from the second quarter 2008, at least five months later. Ideally the comparison should be for rates from similar periods, reflecting the ULLS charge that applied to that particular retail rate. We note that reference unbundling offers within many countries relate to the calendar year and so 2007 retail

17 Ovum (2009) *Telstra ULLS Undertaking – ULLS International Benchmarking*, 26 February 2009.

prices would have been based on the 2007 reference unbundling offer (RUO), not the 2008 rate which would have been published in the RUO for 2008.

Ovum also uses a composite exchange rate in its study, combining the market exchange rate for the second quarter 2008 (40%) with the purchasing power parity (PPP) rate (60%). The proportions reflect Ovum's claim that 40% of costs are due to capital equipment and 60% are due to labour.

The issue over whether PPP or market exchange rates be used is complex. PPP rates are more appropriate to be used for locally-sourced goods and services, and thus it would be expected that some proportion of capital equipment will be obtained locally, the remainder being purchased in foreign currency. We also note that this proportion may vary from country to country – for example in France it may be expected that a relatively high proportion of capital equipment could be sourced from local vendors (such as Alcatel-Lucent).

## 4.2 A basic comparison of current unbundled local loop prices

We obtained current[18] unbundled local loop pricing from our benchmarking sample (defined in Section 2). In this Section we only consider countries with a single national rate, so Canada (discussed in more detail in the previous section) has been excluded.

Prices were converted to Australian dollars using purchasing power parity (PPP) rates.

The median for the prices was AUD14.97, with the interquartile range being between AUD13.86 and AUD17.48 (Exhibit 4.3).

18 Prices were valid as at September 2009.

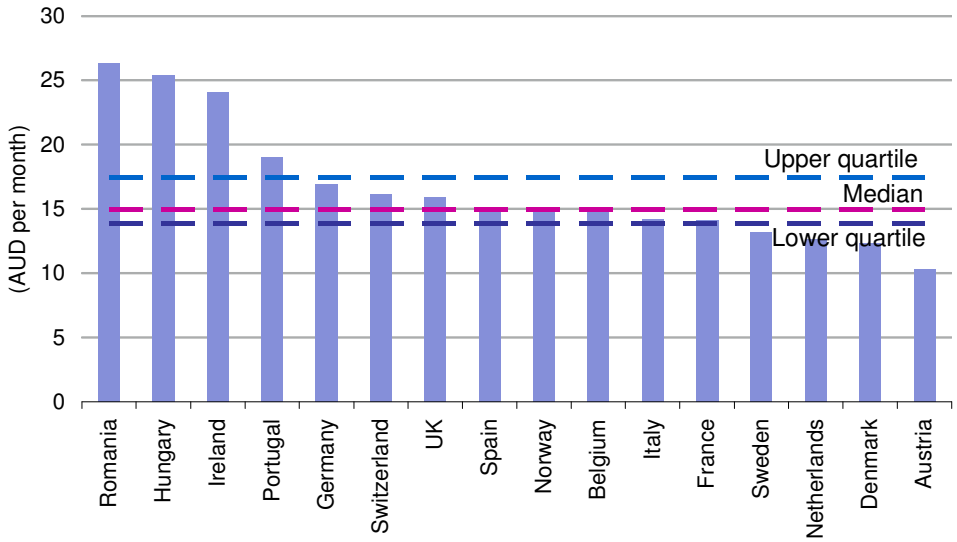



***Exhibit 4.3:*** *Monthly unbundled local loop rental (AUD using PPP rates), September 2009 [Source: regulators, operators]*

So how does this compare with the ACCC's indicative pricing for ULLS? The 2009-10 rate for Zone A is 13.0% above our sample median, and the difference increases to 57.8% for the 2011-12 Zone A rate (Exhibit 4.4). The Zone B rate is more than four times the sample median.

| *AUD per month* | *2009-10* | *2010-11* | *2011-12* |
|---|---|---|---|
| Zone A | 16.90 | 20.00 | 23.60 |
| Zone B | 61.50 | 62.30 | 62.70 |

***Exhibit 4.4:*** *Indicative pricing for ULLS [Source: ACCC]*

The results from the Analysys model are also significantly higher than the sample mean, with the Band 2 price being 34% higher in 2009-10, rising to just under 40% higher by 2011-12 (Exhibit 4.5).

| *AUD per month* | *2009* | *2010* | *2011* | *2012* |
|---|---|---|---|---|
| Band 1 | 3.29 | 3.30 | 3.34 | 3.35 |
| Band 2 | 20.04 | 20.39 | 20.71 | 20.87 |
| Band 3/4 (clustered) | 33.52 | 34.10 | 34.62 | 34.87 |
| Band 3/4 (spread) | 51.86 | 52.75 | 53.53 | 53.90 |

***Exhibit 4.5:*** *Results from the Analysys model, by band [Source: Analysys]*

## 4.3 Summary

As noted previously, basic comparisons of these types do not allow for any adjustments due to the different characteristics of the various countries that may have a material effect on prices. We explore the effect of such adjustments in the next Section.

# 5 A benchmark model for ULLS

The simple benchmark comparison in the preceding Section does not take into account the variation in key characteristics within our benchmark sample. Nor does it provide any evidence for where the Australian rates should lie relative to the sample prices.

The ACCC has stated that international benchmarking is "a useful comparative tool when appropriate regard is had to country specific characteristics"[19].

It is extremely difficult to choose countries which are directly comparable to Australia, due to its unique characteristics. We therefore have used a benchmark modelling approach which recognises that key factors may vary substantially between countries and enables us to estimate the effects which are due to these key factors. The model can be used to predict a benchmark value, given known values of the key factors.

## 5.1 The benchmark methodology

A mathematical model, such as the one we have developed in this study, is a framework by which we attempt to quantify how a variety of key factors (the predictor or explanatory variables) may influence the outcome of our response variable (in this instance, the monthly rental for an unbundled local loop).

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19 Australian Competition and Consumer Commission (2009) *Draft pricing principles and indicative prices for LCS, WLR, PSTN OTA ULLS, LSS*, August 2009.

Within the modelling process we develop a mathematical function (our model), using the observed data within the benchmark sample to estimate coefficients of the explanatory variables and to provide evidence of how well our model fits this data.

The procedure is to estimate the function, using a statistical technique known as multiple regression.

In the process of obtaining our model specification, we examined and rejected a number of alternative models. These alternatives covered differing model functional forms and different selections of variables. Note that in our investigations, we were constrained in our selection of explanatory variables in any single model so that we did not introduce multi-collinearity[20] problems.

In order to select a single model from the options we tested, the following criteria were applied:

- the model must have an acceptable fit, as indicated by the normal statistical diagnostic tests
- we are able to account for the sign of every coefficient
- the model must produce reasonable estimates.

The typical reasons for rejecting a variable in favour of those in our selected model form were:

- models that included the variable had poor, or unacceptable, fit
- other variables that were strongly correlated with the variable produced models with significantly better fit
- the variable proved not to be statistically significant.

When dealing with real-life data, the modelling process is rarely simple and straightforward:

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20 Multi-collinearity refers to a situation in which there is some type of linear relationship between the explanatory variables. If such a relationship exists – that is, there is correlation between the explanatory variables – the results from the multiple regression analysis may be misleading.

- Any model is only as good as the data on which it is based – hence we try to obtain as many observations as possible, and use reliable data for the predictor variables. However there may be some critical factors which are impossible to quantify or collect – for example loop lengths which, as noted by Ovum[21], are available for only a few countries.

- Models are an approximation of reality – the real world is generally much more complex than can be captured within any model and so we do not expect to be able to capture and identify every factor that may have an impact on unbundled local loop prices.

So that when we compare the results from our model with our observed data, we do not expect to see a perfect fit. Similarly, when using our model to estimate values for our response variable, there will be some confidence interval associated with the resultant estimates. In the results we therefore quote not only "point" estimates of our benchmark results for Australia but also indicate a range within which it is reasonable to expect the Australian benchmark to lie.

## 5.2 The benchmark model

Using the data from our benchmark sample (excluding Canada) and the methodology described above, a satisfactory model for monthly ULLS rental was determined. The model is specified as follows (note that the figures in the parentheses are the *t* statistics[22]):

$$\ln(price) = 3.65_{(2.02)} - 0.11_{(-1.13)} \times LRIC - 0.28_{(-0.75)} \times \ln(Urban) + 0.05_{(0.99)} \times \ln(Area) - 0.11_{(-3.13)} \times \ln(UB)$$

Adjusted $R^2 = 0.55$

$F_{(4,11)} = 5.59$

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21 Ovum (2009) *Telstra ULLS Undertaking – ULLS International Benchmarking*, 26 February 2009.

22 The *t* statistics are a measure of the significance of each variable within the regression model. The larger (in absolute terms) the *t* statistic, the more significant the variable.

The variables were defined to be:

- *Price* – monthly ULL price converted to Australian dollars using PPP rates
- *LRIC* – a dummy variable, set to 1 if a LRIC methodology is used to determine the ULL rates, zero otherwise
- *Urban* – the percentage of the population in urban areas, multiplied by 100
- *Area* – the land area, expressed in $km^2$
- *UB* – the proportion of the incumbent's access lines that are unbundled (fully or shared), multiplied by 100.

We used data only from countries that have geographically averaged rates and for which the incumbent operator provides services nationwide. Therefore Canada was excluded from this analysis.

There were several other explanatory variables – such as population density and broadband subscribers per 100 inhabitants – that we investigated for possible inclusion in our model, however these were rejected for the reasons outlined above. Other variables known to have a relationship with the cost of unbundled local loops – such as loop length – were not considered due to the limited availability of data.

*LRIC*

The use of LRIC methodologies for determining prices is generally associated with lower prices. As discussed in Section 2.1, the methodology is based on the costs of an economically efficient operator, which in practice is extremely difficult for a real operator to achieve. Prices based on actual costs tend to be higher than those based on LRIC methodologies.

Our model predicts that the effect of a LRIC methodology is to lower the price of unbundled local loops, due to the negative sign associated with the *LRIC* coefficient.

*Urbanisation*

As noted in Section 2.2, population distribution is a factor influencing the cost of telecoms services, with costs being lower in urban areas than in rural areas – for example, loop lengths are shorter (resulting in lower cable costs), and common resources are shared amongst greater numbers of lines.

Urbanisation – the proportion of the population living in urban areas – is one broad measure of population distribution.

In countries with higher levels of urbanisation, we would expect that the average cost of local loops would be lower, due to the higher density of loops in urban areas than in rural areas. With a negative sign for the *Urban* coefficient, our model supports this hypothesis.

*Land area*

The question over whether an operator deploying services to a large area is subject to higher average costs per line is a complex issue: to some extent it will also be influenced by the population density over that operator's footprint, however factors such as transportation costs would be higher for operators serving a greater geographic area.

As discussed in Section 2.2, telecoms services are deployed in only a part of the total land area, however it is difficult to obtain detailed information on this data item. Total land area could be considered as a proxy to represent relative sizes of the operators' footprints (which has the implicit assumption that the proportion of the land area served is similar in each country).

*Unbundled lines*

Services in operation and the number of unbundled local loops are inputs to the Analysys cost model, and so we would expect to see some type of relationship between cost and volume.

In our benchmarking model we have expressed the number of unbundled local loops as a proportion of the incumbent operator's access lines. This represents the level of activity of the wholesale market for unbundled local loops – as noted previously in Section 2.3, an increased level of retail competition can encourage operators to become more efficient, and thus reduce costs, although we note that LRIC-based prices are based on the costs of an efficient operator.

## 5.3 Estimating Australian rates using the benchmark model

The next step in our analysis was to use the benchmark model to predict what the ULLS prices should be in Australia.

If we apply Australian data to the predictor variables, our model suggests that the national average ULLS price for Australia would be AUD17.04. The 95% confidence interval for this result is between AUD12.01 and AUD24.17.

However, we note that the land area for Australia is larger than that for any countries within our benchmark sample – extrapolating our results beyond the range of values within our benchmark sample may be subject to additional uncertainty.

The applicability of the benchmark model to Australian sub-national geographic classifications may also be subject to some additional uncertainty. While we can obtain values for most of the predictor variables, *Urban* presents some difficulties, as this information is not available. We can run scenarios using different values for *Urban* – in fact we find that varying this parameter has only a small effect on the benchmark model results. We can assume that in urban areas (Bands 1 and 2) *Urban* may take a value of 100, which is outside the range of values within our benchmark sample, however a value of 90 is below the maximum value in our sample (97.3 in Belgium). The lowest value for *Urban* in our benchmark sample is 54.1 (for Romania) and so values of *Urban* below this – for example in rural areas – may also result in similar additional uncertainty.

Therefore we have also used our benchmark model to estimate prices for Bands 1 and 2, and for Zone A (Exhibit 5.1). For each of these, we have assumed that *Urban* is 100, that is, all the population are in urban areas – reducing *Urban* to 90 has a small effect on the

model result. Values for land area and *UB* were able to be determined from the geotyping data provided with the Analysys model.

| | *Urban value* | *Benchmark model result* | *Benchmark 95% confidence interval* | *Analysys model 2009 result* |
|---|---|---|---|---|
| National | 88.6 | 17.04 | 12.01 – 24.17 | 28.29 |
| Zone A | 100.0 | 13.38 | 9.43 – 18.97 | 21.62 |
| | 90.0 | 13.78 | 9.71 – 19.54 | 21.62 |
| Band 1 | 100.0 | 8.96 | 6.32 – 12.71 | 3.29 |
| Band 2 | 100.0 | 11.80 | 8.32 – 16.74 | 20.04 |
| | 90.0 | 12.16 | 8.57 – 17.24 | 20.04 |

***Exhibit 5.1:*** *Benchmark model results for different geographic classifications [Source: Network Strategies, Analysys]*

However, caution should be taken if attempting to use our benchmark model for estimating benchmark prices at the sub-national or geotype level. While it is possible to obtain values for most of the variables and assess the result for a range of values for *Urban*, it should be noted that the model is based on national average values from the benchmark sample. It is possible that there are additional drivers of variation at the sub-national level that are less significant at the national level, and thus may not be captured within a model based on national data.

These results indicate that in comparison with unbundled local loop prices in Europe, and adjusting for key local factors that were found to have an effect on price, the results from the Analysys model appear to be high. This implies that the model and its inputs should be examined to determine if the model or its inputs require adjustment, or if there is a material cause – not captured by our benchmark model – that may account for this difference.

## 5.4 Summary

Based on the results of our benchmark model, it appears that the underlying costs within the Analysys model may be high relative to those in the countries within our benchmark sample.

Our benchmark model does not explain all the variation in prices we observe within our sample, however it does provide a reasonable fit to the data. While there are other potential predictor variables that could be used within the model, the benchmark sample size is insufficient to support more variables.

# 6 Concluding remarks

Validation of results from a highly complex cost model is extremely important. While inspection of the model and of the input data are important elements of the validation process, it is also essential to review whether the results produced by the model are reasonable.

The Analysys fixed network cost model includes a large number of inputs and assumptions, and the inter-relationships between the data items are extremely complex. Checking the model outputs against equivalent information from other sources provides additional confirmation that the output is acceptable.

We have therefore undertaken this benchmarking analysis in order to assess whether there may be some grounds for further checking of the Analysys model and its inputs.

One key component of our analysis was a comparison of the model results with the Canadian unbundled local loop rates. Despite the Canadian prices not being based on a LRIC-type methodology, but on actual costs, the Analysys model results were in general much higher than the Canadian prices, especially for rural areas. Indeed the model results for the most expensive geotypes (12–14) were higher than the Canadian prices for remote exchange areas and exchange areas which had no year-round road access.

The other core component of our analysis was the development of a benchmark model based on a sample of European countries, and with predictor variables encompassing land area, urbanisation, the proportion of the incumbent's lines that are unbundled, and a dummy variable to indicate if a LRIC pricing principle was used. We found that our benchmark model gave results that were lower than the results from the Analysys model.

While the confidence intervals for our benchmark model results are relatively wide, it still suggests that in comparison with European rates, the Analysys model results are high. There could well be valid grounds for this – while it does provide a good fit to the data, our benchmark model does not explain all the variation within the benchmark sample, and it is possible that there may be some characteristics unique to Australia that we have not been able to capture within the model.

Nonetheless, with these two very different comparative analyses providing similar findings, in our opinion there is firm evidence that the results from the Analysys fixed network cost model are high in comparison with European and Canadian cost-based unbundled local loop prices.

# Annex A: Exchange rates

This report uses purchasing power parity (PPP) rates for 2007 sourced from the World Bank. Average market exchange rates are for the period January to August 2009 and are the interbank rates from OANDA.

| *Country* | *Local currency unit (LCU)* | *LCU:AUD (PPP)* | *LCU:AUD (average market exchange rate)* |
|---|---|---|---|
| Australia | AUD | 1.0000 | 1.0000 |
| Austria | EUR | 0.6159 | 0.5449 |
| Belgium | EUR | 0.6254 | 0.5449 |
| Canada | CAD | 0.8490 | 0.8696 |
| Denmark | DKK | 6.0334 | 4.0595 |
| France | EUR | 0.6391 | 0.5449 |
| Germany | EUR | 0.6011 | 0.5449 |
| Hungary | HUF | 94.5991 | 155.3210 |
| Ireland | EUR | 0.6819 | 0.5449 |
| Italy | EUR | 0.5980 | 0.5449 |
| Netherlands | EUR | 0.6196 | 0.5449 |
| Norway | NOK | 6.3506 | 4.8451 |
| Portugal | EUR | 0.4730 | 0.5449 |
| Romania | RON | 1.0658 | 2.3091 |
| Spain | EUR | 0.5202 | 0.5449 |
| Sweden | SEK | 6.4170 | 5.8708 |
| Switzerland | CHF | 1.1647 | 0.8231 |
| UK | GBP | 0.4535 | 0.4824 |
| US | USD | 0.7019 | 0.7410 |

***Exhibit A.1:*** *Exchange rates used for currency conversion [Source: World Bank, OANDA]*