Pricing Methodologies for Unbundled Access to the Local Loop

Final Report

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The opinions expressed in this study are those of the authors and do not necessarily reflect the views of the European Commission

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1 INTRODUCTION

This is a Final Report on a study for DG Competition on Pricing Methodologies for Unbundled Access to the Local Loop.[1]

1.1 Objectives of the Report

The Commission's objective was to identify the best practices across the EU regarding pricing methodologies used by national regulatory authorities (NRAs) to regulate the tariffs applied by incumbent telecoms operators for the provision of unbundled access to the local loop. An analysis of the influence of the methodological divergences on the dispersion of ULL prices across the EU is also to be carried out.

1.2 Structure of this Report

This report is structured as follows:

- Section 2 presents a summary of pricing methodologies adopted by the Member States and discusses the extent of divergence in prices across the EU;
- Section 3 provides an overview of the different types of costs incurred in providing ULL services;
- Section 4 reviews the reasons for diverging ULL prices across the EU;
- Section 5 quantifies the impact on ULL prices of some of the differences in pricing methodologies used by regulatory authorities through three case studies;
- Section 6 presents the reasons for (and implications of) the increasing trend towards Long Run Average Incremental Cost (LRAIC);
- Section 7 discusses how prices could be set so as to achieve the Commission's policy objectives;
- Section 8 identifies some areas of best practice undertaken by Member States, particularly those using LRAIC methodologies.

Appendix 1 provides an overview of pricing methodologies (and other relevant information) adopted by the Member States. Appendix 2 discusses some of the more technical reasons to expect differences in prices of ULL between Member States. Appendix 3 sets out the policy objectives of the European Commission with regard to local loop unbundling.

[1] Contract Number – Comp/C1/2003/16

2 DIVERGENCE IN PRICES ACROSS THE EU

2.1 Introduction

ULL pricing usually involves a "two-part tariff", with a price of rental and a price of connection. The rental price is usually related to the costs associated with the network (infrastructure and other network capital and operating expenditure), whereas the connection price is related to the costs associated with the activation of the service.[2] This study concentrates on the rental part of the tariff, as the differences in connection charge should be easier to identify and explain.

This section starts by reviewing the practice in Member States and then discusses the extent of — and concern with — diverging prices in Europe.

2.2 The Practice in Member States

The main source of the information presented in this section are the responses provided by the National Regulatory Authorities to the Communications Committee Working Document COCOM 03–05 on local loop unbundling pricing methodologies. The information has been presented in a way that allows similar experience to be clustered together.

The cluster analysis shows that even when NRAs are adopting a similar methodology — CC LRAIC[3] — differences in ULL charges persist. This suggests that differences in the way that assets are re-valued, differences in depreciation methodologies (and their inputs) and differences in the approach to calculating "efficient" levels of cost all matter in material and significant ways. In other words, although the adopted methodology is in principle the same, the way in which this is implemented can be, in our opinion, very relevant to the observed differences of the charges.

2.2.1 Cost base

One important methodological factor is the cost base employed. That is, whether assets are valued at historic costs (HC) or current costs (CC). The following Table presents the cost base in place in each Member State at the date of the questionnaire issued by DG Competition on this issue as well as the cost base the NRAs propose to migrate to in the future.

There are two obvious clusters of countries: those which use current costs accounting (CCA), and those which use historic cost accounting (HCA). A third cluster refers to those countries for which information is not clear.

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[2] This practice is in line with the principle of cost causation. Connection charges should be aimed at recovering connection costs (usually the one-off costs directly associated with the activation of the service), whereas the rental charge is aimed at recovering, over time, the cost of the network.

[3] Austria, Germany, Denmark, France, Greece , Spain, UK

Table 2.1: Current[1] and Planned Cost Base

Country	Current Cost Base	Planned Cost Base	Implementation
Austria	CCA	CCA	Implemented
Germany	CCA	CCA	Implemented
Denmark	CCA	CCA	Implemented
France	CCA	CCA	Implemented
Netherlands	CCA	CCA	
Spain	CCA	CCA	Implemented
UK	CCA	CCA	Implemented
Greece	CCA	CCA	On going implementation.
Ireland	Historic	CCA	CCA is subject to challenge by incumbent.
Italy	Historic	CCA	Not implemented for ULL
Sweden	Historic	CCA	Planned for January 2004 in the fixed network. Planned for July 2004 in the mobile network.
Belgium**	Historic	No change planned	Implemented for network assets.
Portugal***	Historic/ CCA	No change planned	
Finland****	Historic/ CCA	Historic/ CCA	Implemented

[1] "Current" refers to the cost base in place at the time of the questionnaire.

*** Raw Copper: HCA, Shared Pair: CCA*

**** Adjusted for cost and productivity evolution.*

***** The NRA (FICORA) has no power to stipulate methodology to companies, which set their own pricing schedules. The prices have to be cost based. FICORA uses both FDC and current cost methodology. In an internal memo it is implied that the NRA prefers the use of current cost.*

Source: National NRAs.

Table 2.1 shows that most countries have either implemented CCA or are planning to move to CCA. The exceptions to this trend are Portugal and Belgium, which are using a mix of the two cost bases. A special case is that of Finland where there are a large number of operators, each of which adopt whichever cost base they consider the most appropriate.

2.2.2 Cost standard

A second methodological factor is the cost standard used. That is, whether relevant costs are calculated using a top-down FDC (Fully Distributed Cost) method, or a LRAIC approach. The following table shows that there is a clear trend towards adopting a LRAIC methodology.[4]

[4] LRAIC is also referred to as LRIC — the long run incremental cost.

Table 2.2: Cost Standard at the Date of the Questionnaire and Planned Cost Standard

Country	Cost Standard as of beginning of 2003	Planned Cost Standard	Implementation
Austria	LRAIC	LRAIC	Implemented
Germany	LRAIC	LRAIC	Implemented
Greece	LRAIC	LRAIC	*
Denmark	LRAIC	LRAIC	Implemented
France	LRAIC	LRAIC	Implemented
Spain	LRAIC	LRAIC	Implemented
UK	LRAIC (BT), FDC (Kingston)		
Ireland	FDC	LRAIC	Implemented
Italy	FDC	LRAIC	Not implemented**
Sweden	FDC	LRAIC	Implemented
Portugal	FDC		
Finland***	Company specific	Company specific	Implemented
Netherlands	EDC		
Belgium	Raw Copper: Retail Minus Shared Pair: LRAIC	No change planned	
Luxembourg	N/A		

** EETT has approved the LRAIC methodology subject to certain improvements regarding Shared Access to the Local Loop that the SMP operator (OTE) must implement (EETT Decision 252/67 29-4-2002). On January 2003, EETT completed the auditing for the monthly rental, connection fee and related facilities and published the Decision 277/63/28-3-2003 with new ULL prices, which are cost oriented in their majority. As a result of the auditing, EETT specified to OTE improvements to be implemented in its costing system. The above mentioned improvements basically referred to the determination of the monthly rental and the connection fees. Prices for OTE's related facilities have been set by EETT's auditor with a bottom-up procedure. The current monthly rental and connection fees for ULL are based on the LRAIC methodology implemented with those PSTN cost components which are common with ULL.*

*** Implemented for interconnection services only, the criteria and methodology for the application of CCA to the Access network are still under evaluation.*

**** The NRA (FICORA) has no power to stipulate methodology to companies, which set their own pricing schedules. The prices have to be cost based. FICORA uses both FDC and current cost methodologies. In an internal memo it is implied that the NRA prefers the use of current cost.*

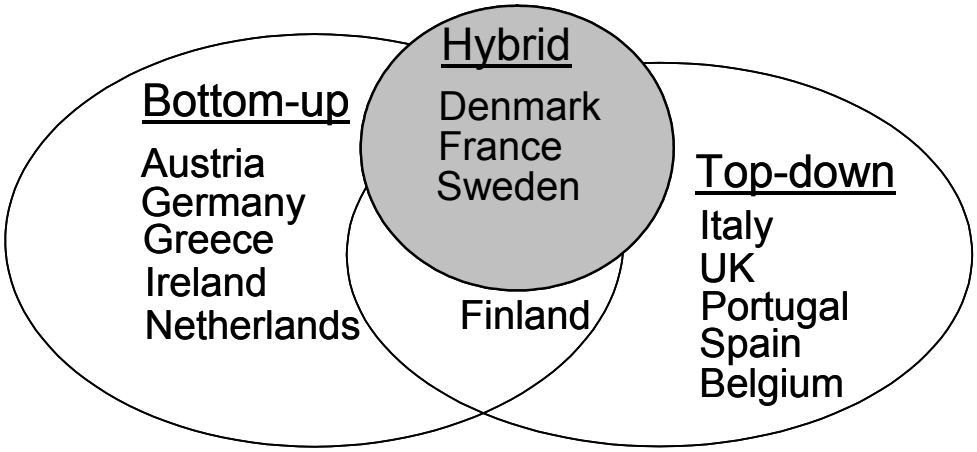
Source: National NRAs.

The table shows most countries already use LRAIC. There is a group of three countries (Ireland, Italy and Sweden) that are planning to move from FDC to LRAIC. There is also a small group of countries which either use LRAIC along with another cost standard or another cost standard. Of these countries, Finland is again a special case where the choice of the cost standard is up to the operator and there is not a cost standard that is uniformly applied to all operators.

2.2.3 The cost model

The methodology or tool actually used to calculate costs is another potential source of the observed ULL differences. Below, we consider a clustering of the countries on the basis of the cost model they have used.

Chart 2.1: Type of Model Used to calculate ULL Costs



The use of model in Finland is company specific.

No information was available on Luxemburg.

2.2.4 The cost of capital

The cost of capital can also affect the cost of ULL in Member States.

Table 2.3: Cost of Capital (WACC) Used for Calculation of ULL Charges

Country	Cost of Capital (%) (pre-tax)
Austria	9.34
Belgium	12.88
Denmark	10.85
Finland	Various*
France	10.4
Germany	8
Greece	12.12
Ireland	12**
Italy	13.5
Luxembourg	N/A
Netherlands	10.7-13.4
Portugal	N/A
Spain	12.34
Sweden	15
UK	13.5

** All operators determine their prices by themselves and the return may vary among operators. FICORA then evaluates the reasonableness of theoperators' return estimates on a case-by-case basis using the WACC method (evaluation is included in the possible cost orientation investigations concerning the SMP and the charges in question)*

*** The cost of capital used for the calculation of the ULL charge was 12 per cent up to 31 March 2004. Since April 2004 this has changed to 11.5 per cent.*

Source: National NRAs.

The cost of capital used for setting the ULL charge in Germany was the lowest among all countries for which the relevant information was available. The highest cost of capital reported was that used in Sweden with 15 per cent, although a LRAIC model developed by the NRA uses a nominal pre-tax rate of 12 per cent.

There are a number of different ways of estimating the cost of capital. However, the most common approach seems to be the WACC, which is the weighted average cost of debt and equity. WACC before tax is calculated as:

$$WACC_{before\ taxes} = R_E \bullet \left(1-g\right) \Big/ \left(1-t\right) + R_D \bullet g$$

where

R_E is the cost of equity;

R_D is the cost of debt;

g is the ratio of debt to debt plus equity (gearing); and

t is tax.

The WACC values reported in Table 2.3 are all pre-tax. Turning them in post-tax values requires their multiplication with (1-tax). However, in estimating the pre-tax WACC one needs to divide with (1-tax) at some point in the process. This implies that the higher the corporate tax rate the higher the pre-tax WACC value and the lower the post-tax WACC value. In other words, the differences reported in the Table may be partly explained by differences in the tax rates used.

The Capital Asset Pricing Model is the model most often used to determine the cost of equity. According to the CAPM the cost of equity is computed using three factors. These are:

the risk free rate (R_f);

the equity-risk premium (ERP); and

the value of beta (β)[5] for the company in question.

Specifically CAPM asserts that:

$$R_E = R_f + \beta \bullet \left(ERP\right)$$

In order to examine why the cost of capital may vary between Member States we have reviewed the approach taken by IT-og Telestyrelsen in Denmark, the OPTA in the Netherlands and Oftel in the UK. All three regulators used WACC to determine the cost of capital. The estimated cost of

[5] Beta is a measure of the relative riskiness of holding a particular company's stock versus the market portfolio.

capital for the UK, Denmark, and the Netherlands is 13.5,10.85 and 13.2 per cent respectively. The Table below compares the values of the formulae inputs used by the regulators in these three countries to reach these results. More precisely, the regulators estimated the cost of capital for a set of different gearing values and then used the midpoints of the resulted value range. Therefore, the cost of capital shown in Table 2.4 differs to that reported above (13.5, 10.85 and 13.2 per cent).

Table 2.4: Comparison of WACC Data Inputs

	UK (%)	Netherlands (%)[6]	Denmark (%)
Gearing (g)	30	17	37.5
Risk free rate (R_f)	5.1	4.97	5.1
Beta (β)	1.29	0.84	1.14
ERP	5	7	3.75
Debt premium (DP)	1.75	0.5	1.5
Tax (t)	30	35	30
Cost of Equity (R_E)	11.55	10.85	9.375
Cost of Debt (R_D)	6.85	5.47	6.60
WACC	**13.61**	**14.78**	**10.84**

Sources: *Rapport om Hybridmodellen (December 2002), IT – og Telestyrelsen*

Proposals for Network Charge and Retail Price Controls from 2001 (21 February 2001), Oftel

Decision of the Commission of the Independent Post and Telecommunications Authority on the extent to which the tariffs proposed by KPN for voice telephony are cost oriented (2 September 1998), OPTA/E/98/2190

Some of these parameters are quite sensitive. For example, an increase in the value of beta by 10 per cent results in a 4-5 per cent increase in the WACC estimate (this applies to the three cases above) which in turn implies a sizeable increase in the cost of raw copper as shown below.[7] A regulator needs also to address other issues that affect the beta (β), such as the question of whether the relevant beta to be used is that of the activity or that of the company as a whole. There are differences in the approach taken by regulators on that matter. For instance, Oftel decided to use the equity beta for BT as a whole as an estimate of the equity beta of the regulated business.[8] On the other hand, OPTA believes that activity-specific betas should be used.

The difference between the cost of capital values estimated by the three regulators may not appear significant. However, even seemingly small differences in this case can have a significant impact. The table below attempts to quantify the impact small difference would have on the

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6 The inputs and result of the WACC estimation are outdated as newer estimates are currently used by OPTA. These numbers are used for demonstration purposes only.

7 The value of beta reflects the variability of returns to the equity of the company in question compared with the variability of returns on the stock market in general. The beta of a listed security can be estimated by calculating the covariance of the security against the market index. However, the estimate depends on the frequency of the data used and this is one point which may give rise to differences in estimates.

8 Proposals for Network Charge and Retail Price Controls from 2001 (21 February 2001), Oftel.

estimated cost of raw copper. Using the publicly available Danish hybrid model we estimate the cost of raw copper for three values of the cost of capital. The results are shown in the Table below.

Table 2.5: Impact of the Cost of Capital on the Cost of Raw Copper

	Monthly cost in €	Monthly cost in €	Monthly cost in €
Cost of capital	10.85%	13.5%	14.78%
Raw copper	10.27	12.22	13.21

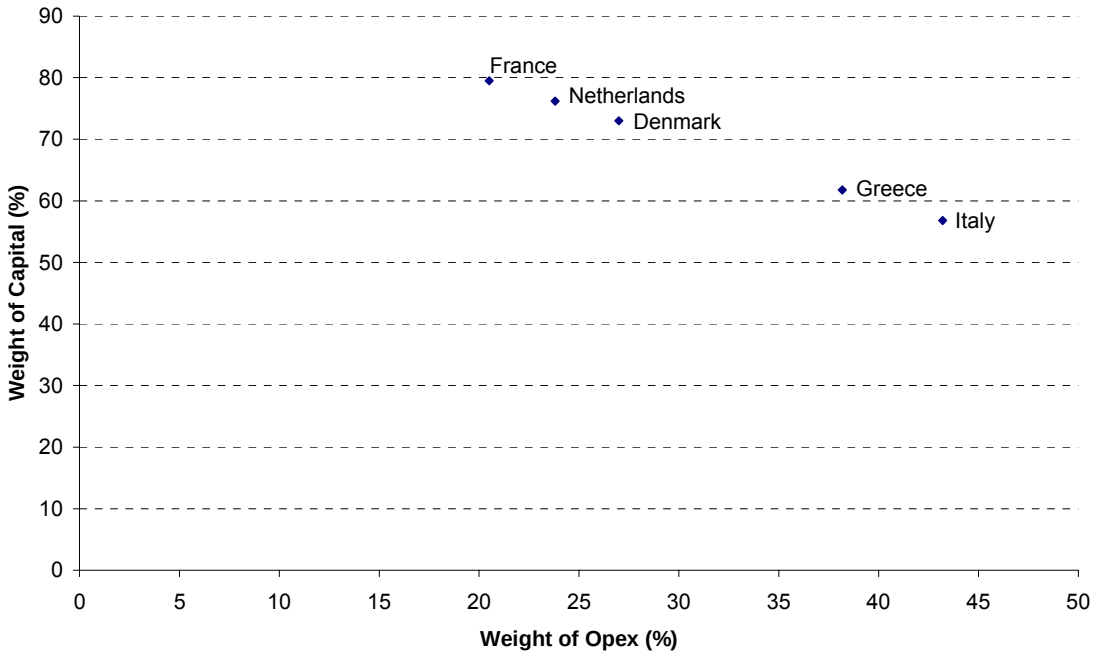
The Table shows that a difference of just 2.65 percentage points in the cost of capital can result in an increase of almost 20 per cent in magnitude in the estimated cost of raw copper. Similarly, an increase by 3.93 percentage points in the value of the cost of capital would result in an increase by almost one third in the cost of raw copper. This simple example shows that the cost of raw copper is quite sensitive to the cost of capital largely because raw copper is a capital intensive product and the application of the cost of capital will have a significant impact.

2.2.5 The mix of capital costs and operating costs

A last factor we consider is mainly related to the network rather than the methodological factors. This is the relative weight of capital and operational expenditure. The main determinant of their relative weight is the way the network has been configured and the way the assets have been valued.

The Chart below plots, for some Member States, the weight of capital expenditure (depreciation charge plus relative cost of capital) and of operating expenditure in the ULL charge. The Chart draws on the information contained in the COCOM questionnaire. In some cases, however, assumptions have been necessary to extrapolate the relevant information.

Chart 2.2: Weight of Capital Against Operating Expenditure (Periodical Costs)



Some regulators treat these data as confidential and therefore the chart does not show the information on all member states.

2.3 Diverging Prices across EU Member States

Prices charged for unbundling have decreased over the last year, and the average EU monthly total cost for full unbundling (monthly rental plus the connection fee amortised over a year) is €19.4 in 2003, 9.5 per cent cheaper than in 2002. The price reduction has been more significant for shared access, at 28 per cent, with the EU average monthly price reducing from €15.9 in 2002 to €11.4 in 2003.[9]

The Ninth Implementation Report of the European EU Electronic Communications Regulatory Package has noted the following progress with regard to local loop unbundling:

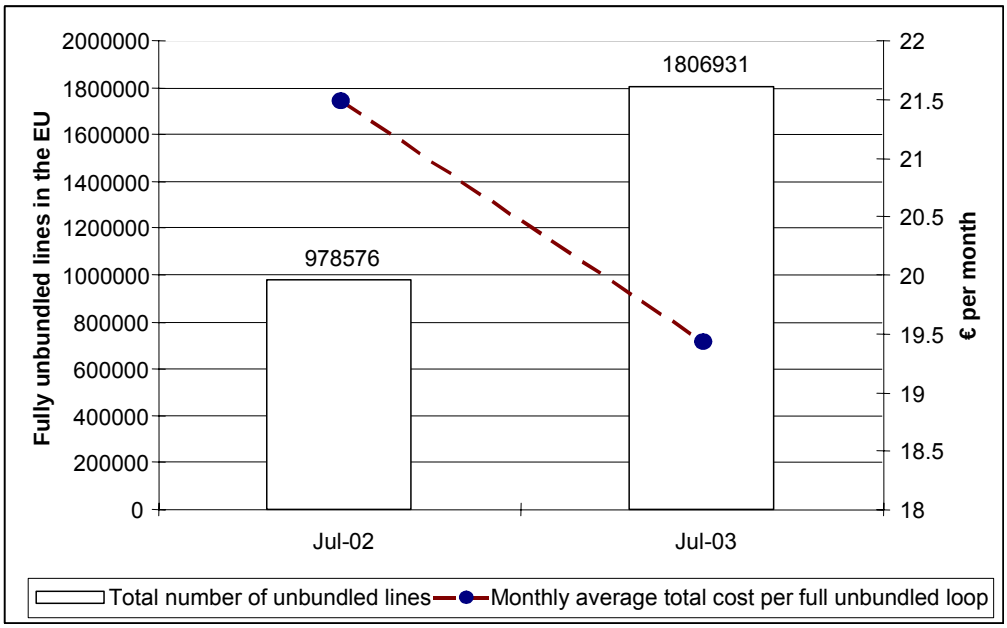
> "With regard to unbundling, 828,000 new lines were taken up between July 2002 and July 2003, whereas only 400 000 lines had been unbundled between October 2001 and October 2002. This significant increase has not been brought about by full unbundling only, as was the case in previous years, and the 171,000 shared lines available now represent 6% of all new entrants' DSL lines, against 1.5% in October 2002. The development of local loop unbundling is still rather unbalanced across the EU and is only just starting to take off. Germany accounts for more than 63% of the unbundled lines[10] and more than 95% of the unbundled lines are concentrated in six countries (Germany,

[9] "European Electronic Communications Regulation Markets 2003", Report on its Implementations of the EU Electronic Communications Regulatory Package, (19.11.2003), p.12.

[10] It should be noted that not all of the fully unbundled lines are used for the provision of broadband services. In Germany, only around 20 per cent of the unbundled lines are used for this purpose.

Italy, Denmark, Finland, the Netherlands and Sweden). In the other Member States local loop unbundling remains at a very low level." [11]

Chart 2.3: Costs and Numbers of Unbundled Lines



Source: "European Electronic Communications Regulation and Markets 2003", Report on its Implementations of the EU Electronic Communications Regulatory Package, (19.11.2003), p.13.

While the trend in price for ULL appears to be decreasing on average, there is considerable variation in prices across EU Member States. Charts 2.4 and 2.5 show the divergence in the monthly rental and in the one-off connection charge for full unbundling across EU Member States in 2002 and 2003.

[11] "European Electronic Communications Regulation Markets 2003", Report on its Implementations of the EU Electronic Communications Regulatory Package, (19.11.2003), p.12.

Chart 2.4: Prices for Full Unbundling (in euros) – Monthly Rental

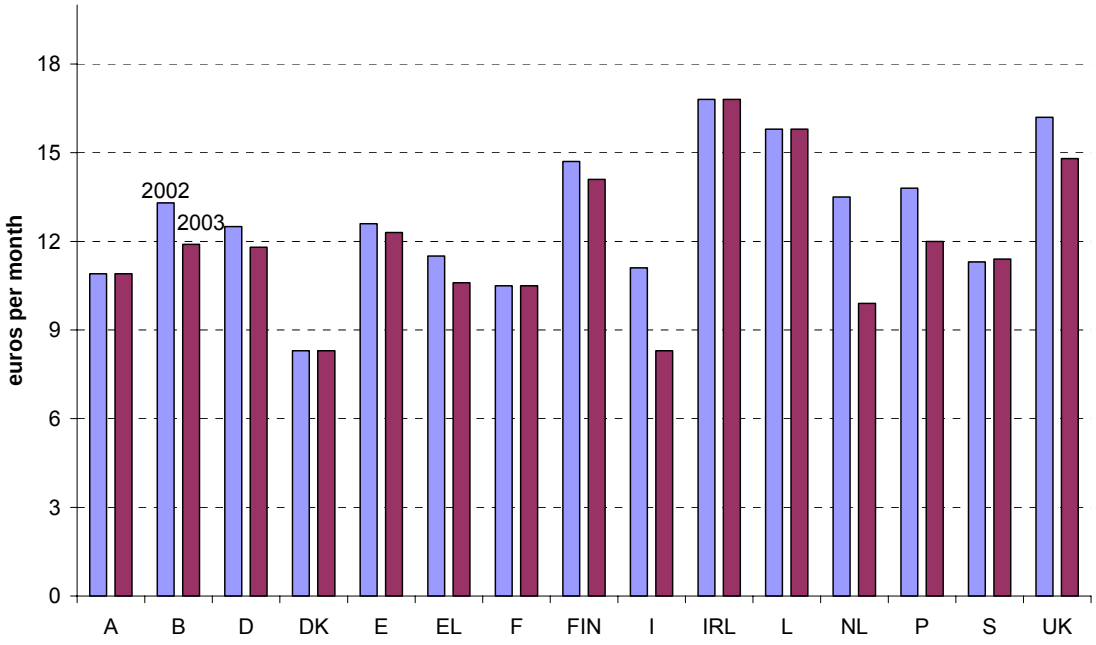
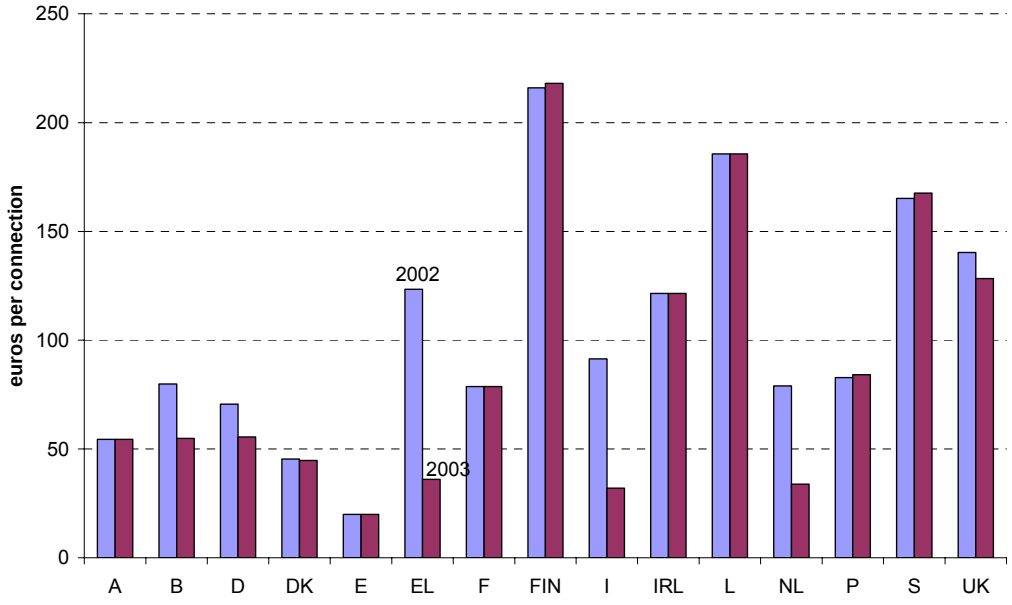


Chart 2.5: Prices for Full Unbundling (in euros) – Connection Charges



Source: Commission of the European Communities, Eighth Report from the Commission on the Implementation of the Telecommunications Regulatory Package, European telecoms regulation and markets 2002, p.27.

Source: Commission of the European Communities, Ninth Implementation Report of the Telecommunications Regulatory Package, European telecoms regulation and markets 2003, p.14 of Annex I.

These two charts show that there is a downward trend in the monthly charge and the connection fee that applies in each Member State. The maximum decrease in the monthly charge was observed in the Netherlands where the annual change was around 26.67 per cent. The reductions in the connection fee were even larger with a 70.75 per cent decrease in Greece. The few exceptions to this trend are Sweden in the case of the monthly charge and Sweden, Portugal and Finland in the case of the connection fee.

The following table shows the same information that is contained in the two previous charts but it restricts the number of countries only to those that according to Tables 2.1 and 2.2 are applying both CCA and LRAIC. The conclusion drawn from this comparison is that even when the same cost standards and cost bases are used the differences can still be significant, e.g. the lowest value of the connection fee amongst these countries for 2003 was €20 (Spain) whereas the highest was €128.3 (UK).

Table 2.6: Monthly and Connection Charge for Countries that Apply LRAIC and CCA (2003)

Country	Monthly Charge 2003 (€)	Connection Fee 2003 (€)
Austria	10.9	54.5
Germany	11.8	55.6
Denmark	8.3	44.8
Spain	12.3	20.0
France	10.5	78.7
UK	14.8	128.3

Charts 2.6 and 2.7 show that the observed divergence in prices across EU countries is prevalent even in the case of shared access to the ULL.

Chart 2.6: Prices for Shared Unbundling (in euros) – Monthly Rental

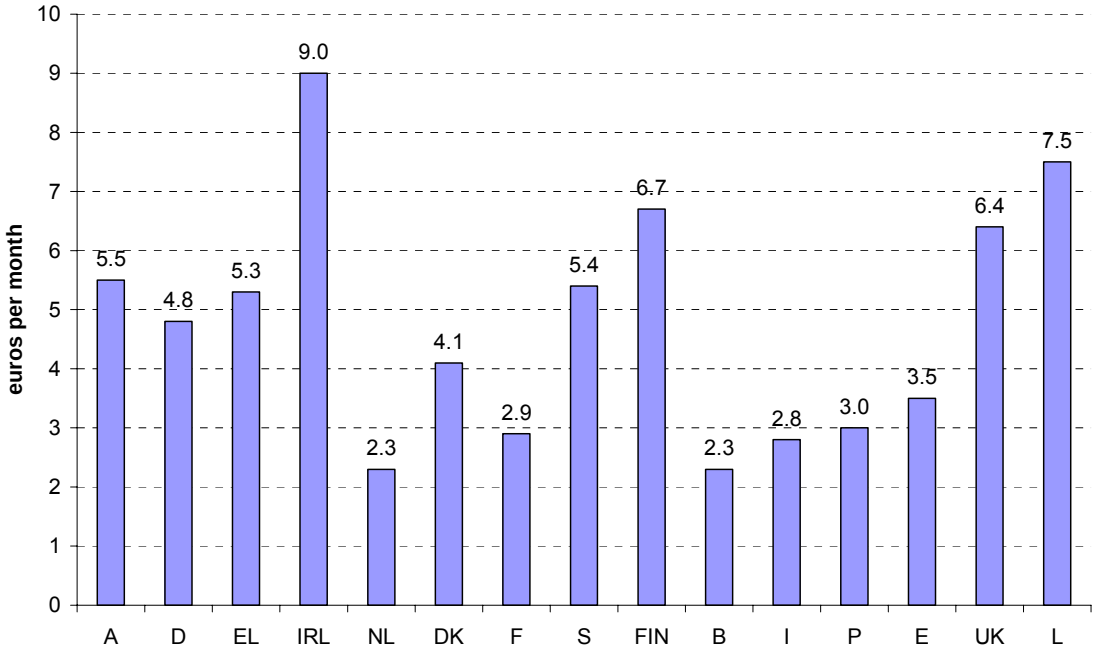
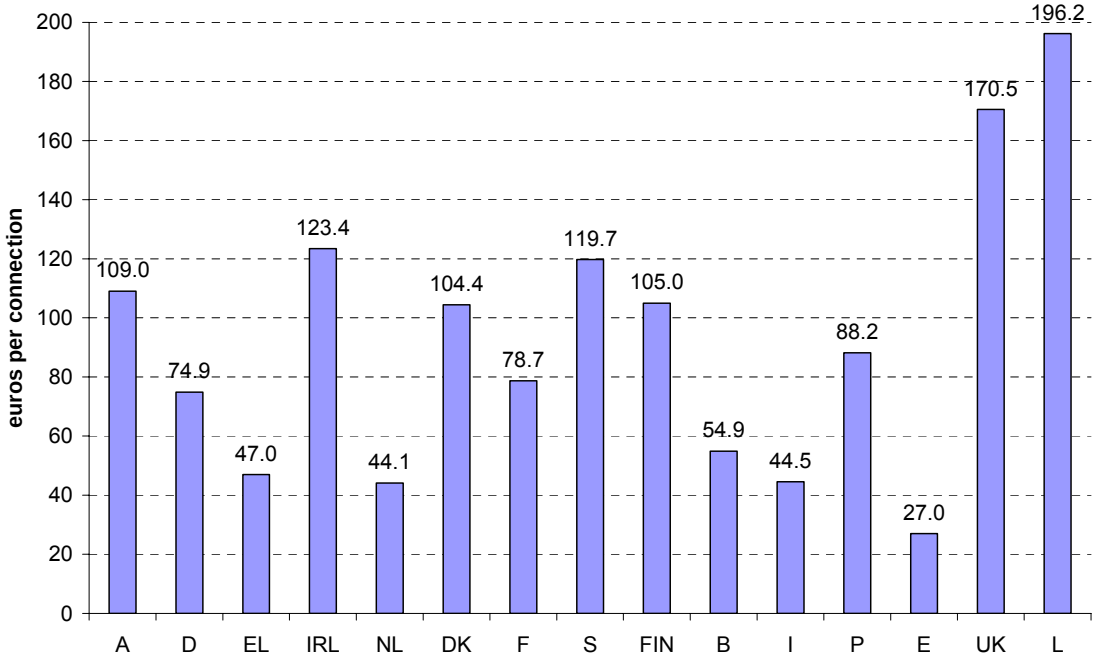


Chart 2.7: Prices for Shared Unbundling (in euros) – Connection Charges



Source: Commission of the European Communities, Ninth Implementation Report of the Telecommunications Regulatory Package, European telecoms regulation and markets 2003, p.16 of Annex I.

2.4 The Commission's Concerns

The European Commission in the Eighth Implementation Report of the Telecommunications Regulatory Package states with regard to the divergences in prices that:

> "The variation in the level of unbundling charges also seems to suggest inappropriate pricing methodologies and cannot be explained merely in relation to differences in population distribution or the actual cost of network elements."

DG Competition and the EFTA Surveillance Authority have carried out between early 2000 and July 2002 a sector enquiry to review the competitive situation in the local loop in the EEA. On 8 July 2002, the Commission organised a hearing with the industry on the findings of this enquiry.

It appeared that the overall proportion of fully unbundled lines across Europe at that point in time did not exceed 0.6 per cent, of which more than 90 per cent are located in Germany, where the incumbent has been obliged to provide full unbundled access under national law since early 1998. When one discounts from the calculation those Member States where unbundling was mandated in 1998 (Germany and Denmark), it appears that only 0.05 per cent of local loops have been fully unbundled in the other Member States. It was calculated that if trends were continued, the proportion of unbundled lines would be unlikely to exceed 2 per cent by the end of 2004. If the pace of the second quarter of 2002 was continued, it would take twenty-eight more years until the proportion of unbundled lines reaches 6 per cent, the proportion attained in the United States six years after local loop unbundling was mandated.

Local loop unbundling is part of several options to provide broadband services and as such is not an end in itself. We understand it to be the Commission's view that ULL is essential to ensure fair competition in the local access market, especially as regards to the provision of broadband access services to residential users. In this regard, ULL was conceived as a means to allow entrants to compete with xDSL services offered by incumbent operators.

The Ninth Implementation Report has noted that 828,000 new lines were unbundled between July 2002 and July 2003 (compared to 400,000 lines between October 2001 and October 2002. But the Report also notes that the development of local loop unbundling is still rather unbalanced across the EU with Germany accounting for 63 per cent of unbundled lines and six countries — Germany, Italy, Denmark, Finland, the Netherlands, and Sweden — accounting for 95 per cent of all unbundled lines.

This study, therefore, reviews the methodology used by NRAs in EU member States and explores the extent to which the methodology chosen by NRAs actually meets the Commission's stated objectives. It also recommends improvements to the methodology used by NRAs.

3 THE COSTS INVOLVED IN PROVIDING ULL SERVICES

3.1 Introduction

This section provides a brief overview of the technical features of unbundled local loops and of the different categories of costs incurred in providing ULL services.

The Commission Recommendations on Unbundled Access to the Local Loop on 26 April 2000 defined the local loop as: "the physical copper line circuit in the local access network connecting the customer's premises to the operator's local exchange, concentrator or equivalent facility". Local loop unbundling would allow other operators to gain access to the local loop and the associated facilities of the incumbent operator(s). Regulations specifically require physical access (either shared access or full access), in which the access seeker has direct access to the transmission medium and can decide how to use it within limits defined in physical terms.

Although local loops are the main component of access networks, there are other network elements in access networks that have typically been excluded from the cost of ULL products in EU Member States. These network elements include line cards, which connect customers to the core network (these will be provided by new entrants themselves when they purchase ULLs from the incumbent), as well as other access technologies such as fibre and wireless.

3.2 Costs Recovered Through a Monthly ULL Charge

3.2.1 Network Costs of the Local Loop

The cost components involved in providing ULL can be grouped into five major cost categories. These are:

1 network assets;

2 non-network assets;

3 direct network operating costs;

4 direct non-network operating costs; and

5 indirect operating costs.

Network Assets are those assets that make up the physical infrastructure used in the provision of the local loops to the customers' premises. These assets include, but are not limited to:

- Underground and overhead (on poles) drop cable.
- Underground and overhead (on poles) distribution and feeder cable.
- Poles.
- Duct (including the capitalised cost of digging trenches).

- Manholes.
- Joint boxes.
- Network Termination Points.

These assets mainly serve the access network but some of these (such as trench and duct) will also be used by the core network.

Non-network assets support the operation of the network assets described above. Unlike network assets, the requirements of non-network assets are not directly determined by underlying demand cost drivers such as the number of lines or the extent of calls. These assets are generally common to all the businesses of the operator in question, i.e. both the access and the core networks. They include, but are not limited to:

- Buildings. These include both buildings where the switching and transmission equipment (along with Main Distribution Frame (the MDF)) are located and the buildings housing administrative and staff offices.
- General purpose computers. These assets are designed to perform general administrative information processing activities such as the preparation of financial, statistical, or other business analytical reports; preparation of payroll; customer bills; and cash management reports. They do not include the computers and their associated peripheral devices associated with switching, network signalling, network operations, or other specific telecommunications plant.
- Vehicles.

Direct network operating costs are the costs directly associated with the operation of network assets which are only used in the provision of the local loops to the customers' premises. The principal activities include fault repairs and preventive maintenance. The main cost categories involved are therefore manpower (wages) and other costs directly associated with these activities (e.g. tools, insurance etc.). Direct network operating costs might also include costs associated with changes in customer location.

Direct non-network operating costs are the costs of operating and maintaining the non-network assets. These refer to the costs of operating the buildings (security guards, electricity etc), the wages of the IT department, fuel and maintenance costs of the vehicles and the costs of administering and billing wholesale services.

Indirect operating costs contrast with direct operating costs in so far as they are incurred to run the business of a telecoms operator as a whole and not just the access part of its network. Moreover, they do not refer to the costs incurred in running assets, they are rather expenses associated with the administration of the business. The chairman's salary is the classic example for this cost category. Indirect operating costs are mainly wage costs. Part but not all of indirect operating costs can be attributed to local loop services. They include, but are not limited to the costs of accounting and finance, human resources and external relations. These are therefore mainly wage costs.

Table 3.1 attempts to illustrate the significance of each of these cost categories in determining the ULL monthly charge by referring to their relative weights as estimated in the Danish hybrid modelled developed by IT- og Telestyrelsen in 2003 to set access and interconnection charges.

Table 3.1: Relative Weight of Cost Categories on ULL Rental Charge Monthly in the Danish Hybrid Model

Cost Category	Weight (%)
Network assets*	68**
Non-network assets	5
Direct operating costs***	14
Indirect operating costs	13
Total	**100**

** The cost categories here identified as network and non-network assets refer to both the annual depreciation charge and the cost of capital associated with the assets in question.*

*** In the Danish hybrid model the network asset costs associated with the network termination point are considered as part of the one-off charge and are therefore not included in the monthly rental charge.*

**** This category includes both direct network and direct non-network operating costs*

The weights shown in the Table are taken from the Danish hybrid model and are used for illustration purposes.

3.2.2 Network costs of new entrants

Access seekers incur other costs in addition to the wholesale price imposed by the ULL provider and overall these costs are relevant when considering the potential development of competition in the particular market.

This section does not attempt to analyse in detail the costs the access seeker is facing in order to make use of full or shared ULL. Instead it attempts to list the main network and non-network cost elements relevant to the new entrant so as to demonstrate that there are significant costs other than the wholesale charge that the potential new entrants will incur. These extra costs include, but are not limited to, the following:[12]

- *Line cards*. These are provided by new entrants themselves when they purchase ULL from the incumbent.

- *Splitters.* Depending on the type of access sought by a potential new entrant a splitter may have to be installed in the newcomer's network, i.e. full ULL requires the access seeker to install his own splitter whereas the incumbent provides the splitter in the case of shared ULL.

- *Co-location*. In order for an access seeker to provide service over an unbundled loop, co-location will be needed. Additionally, there are a number of other costs that are incurred due to the need for services that support co-location. These services vary depending on

[12] The list below does not distinguish between the extra costs specific to full ULL, shared ULL and bitstream separately.

the form of co-location the new entrant favours. The co-location options as defined by the Independent Regulators Group that are available to the access seeker are typically the following: [13]

(a) *Physical co-location* — where a beneficiary can request space to locate its equipment within the notified operator's Main Distribution Frame (MDF) site (or equivalent distribution point closer to the user premises), either in the building containing the MDF or in other space that could be made available in the site (such as adjacent buildings, car parks or warehouses). This space can be fitted and operated either in an area without a permanent barrier between the beneficiary and the notified operator equipment (co-mingling), or be shared with other beneficiaries, or be in a separate room, depending on the requirements of the beneficiary and the availability of suitable space.

(b) *Distant co-location* — where a beneficiary can choose to use its own premises and connect to the notified operator's local MDF site (or equivalent distribution point closer to the user premises) through the means of an external tie-cable connection, see below.

(c) *Virtual co-location* — where the notified operator houses, owns and runs equipment located in its premises at the MDF site (or equivalent distribution point closer to the user premises) on behalf of the beneficiary.

- *Tie Cables.* Tie cables connect the MDF with the Hand-over Distribution Frame (HDF). When the new entrant is employing distant co-location, they require a tie cable that runs inside the notified operator' s building (internal) or one that runs outside the notified operator' s building (external).

- *Hand-over Distribution Frame (HDF)*. An HDF is needed to terminate the tie cables which extend the local loop from the MDF to the user premises to the new entrant's co-location space.

- *Cost of backhaul services.* The equipment in the co-location space needs to be connected with the new entrant's core network.

- *Power*. In the case of physical co-location, the new entrants may wish to have their own power feed from a power company.

- *Air conditioning/chilling/heating.* Some of the equipment installed by the new entrant require air conditioning/chilling/heating. Depending on the co-location arrangements the new entrants may need to incur the cost of providing those.

[13] "Principles of implementation and best practice regarding ULL – as decided by the Independent Regulators Group 18 October and amended in May 2002"

- *Relevant operating costs*. These are costs relevant to the operation and maintenance costs of the new entrant's installed equipment referred to above.

- *Retail costs*. The new entrant faces the retail costs of providing the products that use the ULL and bitstream services.

Not all of the costs listed above are involved in all the types of access (full ULL, shared ULL and bitstream access). Different type of access will be associated with a different set of the costs identified above.

3.3 Connection Costs

Connection charges are one-off charges, not typically recovered through a monthly payment. The activities involved may differ from one network to another but generally include the items contained in Decision Notice 14/00/CIR issued by the Italian regulator, Agcom. These are summarised below:

- Managing of the requests. This refers to inserting the data on the loops to be unbundled in the incumbent's line management systems.

- Testing. This mainly refers to the activity carried out to test that the line is satisfactory for the implementation of xDSL products.

- Commercial verification.

- Issuing the job order to the technical department in order to get the technical part of the job done.

- Technical operation. It is usual to co-locate the ULL operator's broadband equipment in a separate collocation room in the incumbent's local exchange building. The access pair to be unbundled has therefore to be diverted from the incumbent's Main Distribution Frame (MDF) at the local exchange to the ULL operator's broadband equipment, which is connected to the Handover Distribution Frame (HDF). This is carried out by connecting the pair terminated on MDF side to an internal tie cable to the HDF through a "jumper".

- Inserting client data from the OLO.

In the same Decision Notice, Agcom reports the time estimates proposed by the incumbent operator Telecom Italia (TI) to carry out the activities specified above. The same document lists the adjustments made by the Authority to TI's estimates and sets the connection charges accordingly. The following table summarises the results of that exercise.

The table below is presented only because of its relevance in terms of listing the specific items involved in connecting ULL customers and the importance of reviewing and, where appropriate, adjusting estimates provided by incumbent operators. The information in the table is provided as useful information. The data are now dated and operators have more experience with ULL and the activities and time estimates may, of course, have changed.

Table 3.2: TI's and Agcom's Estimates of Connection Related Activities

Activity	TI's estimate (minutes)	Agcom's estimate (minutes)	Agcom's comments
Management of the requests	30	7	95 per cent of the requests are assumed to take the ordinary 5 minutes; the remaining 5 per cent could be more problematic and require 30 minutes. Weighted average: 7 minutes
Testing	30	15	A more efficient management of the task is assumed.
Commercial verification	10	6	95 per cent of the requests are assumed to be ordinary and the remaining 5 per cent could be more problematic. Weighted average: 6 minutes
Issuing the job order	10	5	A more efficient management of the task is assumed.
Technical operation	75	30	Agcom's estimate takes into account not only time spent on site per copper pair (15) but also travelling time (15)
Inserting client data	15	15	N/A
Total	**170**	**78**	

Source: Delibera 14/00/CIR, Valutazione delle condizioni economiche dei servizi di accesso disaggregato a livello di rete locale contenute nell'offerta di riferimento di Telecom Italia del 12 maggio 2000, on the Agcom website

A mark up of 10 per cent on the time estimates indicated in the table above is then added to allow for other possible activities related to the single services. These estimates are then referred to as "direct costs" of connection.

The following figures are then marked-up on the direct costs to cover for indirect costs:

- 29 per cent to cover costs such as building and energy expenditure.
- 21 per cent to cover for staff overheads.

The overall connection charge is then estimated to be 174,400 Italian Lire, equivalent to approximately €90.

4 REASONS FOR DIFFERENCE

This section discusses the reasons why prices for unbundled local loops in EU Member States may differ. This section draws on our experience as practitioners, and on the country surveys reported in Annex 1.

The section includes a discussion of the potential for differences in costs (and prices) caused by differences in the access networks of incumbents operators. Although these may be significant and a major reason for cost differences between Member States, they are not the scope of this study which is to explore differences in the methodologies used by NRAs to set prices.

4.1 Introduction

This section deals mainly with the reason for differences in rental charges as the differences in connection charges should be relatively easy to identify. Connection charges for example, would already be in "current cost" format as they would relate to the actual costs of connecting a ULL product. In other words, there is no need to adjust the historic costs. Similarly, there is no fundamental issue with depreciation (although the connection charge could be spread over a number of years and this could differ across Member States).

The differences in connection charges of different Member States should therefore be explained by differences in the efficiency in carrying out the activity and in differences in the number of years over which certain connection related costs are spread. But despite this, Chart 2.5 showed a great deal of variation of connection charges around the EU Member States (from €20 to more than €200 in 2003).[14]

4.2 Explaining Differences in the Monthly Charge for ULL

The focus, therefore, of this section is to explain differences in the rental charge for ULL. The differences can be classified into three broad categories.

- Network factors. These factors result from variations in the structure and configuration of the access network, reflecting differences in the way that incumbent operators connect their customers to the network, and in the difficulties of making connections. These factors would account for differences between ULL costs in two Member States that adopt the same methodologies using the same inputs (see below).

- Methodological factors. These capture differences arising in costs because of differences in the methodologies used by Member States to estimate costs and/or set prices.

[14] The observed differences could well be due to a different allocation of different cost components to the rental charge or to the connection charge. For example, network termination point (NTP) costs in Denmark are recovered through the connection charge, whereas other Member States may recover these through a monthly rental charge.

- Inputs. These will include all those inputs that are not related to the structure of the network and that affect results through the methodological factors (e.g. input costs and asset lives as an input of the depreciation methodology).

4.2.1 Network factors

It is not possible in this study (if at all) to quantify the differences in ULL rental charges due to network factors. The purpose of this section is to describe the source and nature of differences in the methodological factors and to discuss how differences in methodologies and the inputs used may affect the price of ULL. A discussion on how network factors can affect network costs (and consequently the ULL rental charges) is presented in Annex 2.

4.2.2 Methodological factors

The following methodological factors are here considered in turn:

- the cost standard;
- the cost base;
- the depreciation methodology; and
- more general process issues.

4.2.2.1 Cost Standard

A number of different cost standards can be used to set charges for ULL. These include fully distributed historic costs (FDC), long run average incremental cost (LRAIC) and "retail minus".

A Fully Distributed Cost (FDC) model allocates all costs recorded in the company accounts (which are normally in historic terms) to one or other of the firm's products. It first identifies the costs that are directly attributable to each product or service, or to each class of customer. It then allocates all other costs according to measures such as output share, revenue share, or price-proportional mark-ups. The allocation rules are generally mechanical and therefore relatively easy to implement. But they are also often arbitrary. The FDC of a service does not generally have any economic significance; in a competitive market the price of a service may be greater than, less than or the same as the service's FDC.

FDC systems may at times be considered arbitary as their objective is to distribute all of the costs to services rather than explore questions of causality. These systems can be improved by accounting systems, such as activity-based costing (ABC), which try through more detailed analysis to establish causal links between costs and the production of goods or services. ABC seeks to relate the majority of costs to particular activities. This is done by viewing the business as a series of activities, each of which consumes resources and therefore generates costs.

The implications of a long run incremental cost (LRAIC) methodology can be explained by considering each of the concepts that make up a LRAIC charge.

- First, the time period considered is the long run. This is taken to be the period of time in which the cost of all assets, including fixed assets, can be avoided. A LRAIC estimate, therefore, includes in the asset base the costs of trench and other assets with a long life.

- Second, the increment can be defined narrowly (e.g. one line) or broadly (e.g. all services using the access network). A narrow definition will mean that many of the costs that are shared and common between products and services may be excluded in a LRAIC estimate as they may not be able to be avoided if the line were not provided. A broader definition means that many of the shared and common costs will be included in the LRAIC estimate and these then need to be allocated to the individual services within the access network. The A in the LRAIC acronym stands for Average and refers to the average cost per line of the increment (when the increment is defined more broadly, e.g. as the total number of lines).

- Third, the costs that are used are forward-looking costs, in two senses. First, they refer to the costs of a forward-looking network. Such a network is one that would be developed by a hypothetical and efficient new entrant to serve existing demand (that is, it is not necessarily bound by the existing network design, apart perhaps from the number of exchanges, the so-called "scorched node" assumption), and making an allowance for growth. Second, they refer to current costs rather than historic costs, although current costs may not always equate to the "forward-looking" costs needed for LRAIC (see Section 8).

When estimating the ULL charge through a LRAIC methodology, the increment is generally considered to be the access network as a whole, or sometimes that part of the access network required for ULL. The common costs between copper pairs and fibre cable are generally allocated on the basis of some cost driver (for example, duct costs can be allocated to copper and fibre lines on the basis of the relative space taken by copper and fibre cable within ducts). Smaller definitions of the increment would imply a bigger pot of common costs and, if these are not recovered through mark-ups, jeopardise cost recovery.

A retail-minus methodology subtracts from the incumbent's line-rental tariffs an estimate of its retail costs in order to identify the wholesale or network costs associated with the service in question. This methodology makes sense only if tariffs have been re-balancing and the incumbent's retail tariffs for lines allow for the recovery of access costs. If tariff re-balancing has not yet been completed, then basing ULL charges on a retail-minus methodology could undermine the viability of the incumbent operator.

4.2.2.2 Cost Base

If a LRAIC methodology is used and the local loop provider estimates the costs, then they will need to consider the question of asset valuation, and to value the assets according to their

economic value. This usually means valuing assets at their replacement cost rather than historic cost.[15]

ULL charges are increasingly estimated using LRAIC methodologies and these imply that forward-looking should be used. In order to achieve this, the techniques rely on estimates of the current cost or market value of the asset, normally determined as the lower of its recoverable amount (being the higher of realisable value and value in use) and its replacement cost. In times of technological change, the main objective will be to identify the modern equivalent asset value.[16]

The overall effect on asset valuation of moving from historic costs to current costs is ambiguous, although for an access network CCA can be expected to lead to a higher asset valuation. The specific impacts are discussed below.

First, the equipment price of assets will be affected by general and asset specific inflation. More specifically, technological changes and the evolution of labour costs and productivity (the main assets in the access network are capitalised labour costs) are the main factors to take into account. So, if the price trend of the assets used in providing the ULL service is negative, then the usage of current costs, *ceteris paribus*, will decrease ULL estimates. On the other hand, if the price trend of the assets used in providing the service is positive, then the usage of current costs, *ceteris paribus*, will increase the ULL estimates.

The costs associated with laying cables in the ground usually carry a high weight in access networks and as these are labour intensive activities, they will often mean that trench and duct costs will increase when using a current cost methodology.

Second, a CCA valuation may lead to a different result when there have been technological changes over time. In these circumstances the Modern Equivalent Asset (MEA) value of the network may be quite different from that of the existing network.

CCA re-valuations involving MEA will often require adjustments to be made that inject efficiency improvements in the operator's costs. For example, if the existing, obsolete asset includes more capacity than is deemed necessary and appropriate, there is no requirement for the MEA to also have excess capacity. Conversely, in cases where the cheapest replacement provides additional functionality or capacity, this should still be the basis for the MEA. Adjustments should be calculated for service quality and functionality differences, to account for the effect these differences will have on the net revenues generated by the asset for each year of the asset's lifetime. These differences should be discounted by the cost of capital and added to (where the existing asset is superior) or subtracted from (where the MEA is superior) the valuation. In practice, such adjustments will not always be possible.

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[15] An historic cost methodology values assets using the costs incurred at the time assets were purchased.

[16] There are various definitions of the MEA. The MEA definition used here is that of an asset that can produce the stream of services produced by the existing asset at lowest cost.

On the basis of these considerations, we believe that moving from historic to current costs will usually increase ULL charges because of the effect of price changes, often principally of trench, although the impact will depend on the way the methodology has been implemented.

4.2.2.3 Depreciation

In theory, annualised costs should include the sum of economic depreciation and a capital charge.

Economic depreciation is the difference in the Net Present Value (NPV) of the asset at the start and the end of a year. If the asset has an NPV of 100 today, and is expected to have an NPV of 90 after a year, then the economic depreciation of the asset for the year will be 10. The economic depreciation for an asset will depend on a variety of factors: the asset's output, the running costs, the asset's life and the cost of capital.

Economic depreciation is difficult to calculate. For example, in a competitive market it will be necessary to form a view on what technological advances might take place, and how these advances might affect an asset's value. Because of these difficulties, simpler approaches are often preferred. The yardstick by which these simpler approaches should be judged is how close they are likely to come, given the nature of the asset concerned, to the theoretically correct measure of depreciation.

Bottom-up models (based on engineering and current cost assessments) tend to annualise costs using the annuities approach which captures both the depreciation charge and the capital charge.[17] In the absence of price changes the top-down approach (based on adjustments to company accounting data) will result in a decreasing annual charge for any given asset as it increases in age (this is because the depreciation charge is constant whereas the capital charge declines as the net value of the asset declines). By way of contrast, the annuities approach gives a constant charge in the absence of price changes since the depreciation charge rises over time to exactly offset the fall in the capital charge. Where prices change over time, both approaches can be used with price tilts that take account of price changes. When prices are falling, the tilt will result in a higher initial capital charge and a falling one thereafter; where prices are increasing the opposite will be the case.

4.2.2.4 Process issues — bottom up vs. top down

If built under the same methodological assumptions, the two approaches should theoretically produce the same result. However, experience suggests otherwise. Reconciliation exercises have shown some very large differences in the results produced by bottom-up and top-down models apparently built under the same assumptions.

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[17] The annuity method produces the same results as economic depreciation plus a capital charge where running costs are constant between vintages and over the asset's life, output is constant and the asset life in both approaches is the same.

A likely reason for this is the difference of incentives that is usually behind the two models: top-down models are usually built by the incumbent operator and are based on the incumbent's accounts; bottom-up models are usually built either by the regulator or by the other operators.

However, there are a number of additional reasons why the two might produce different results, independent of differences in the factors specifically mentioned above or in the inputs used. These include:

- Costs incurred to run Modern Equivalent Assets. As explained above, the assets that should feature in a top-down model, if current costs are deployed, are not necessarily the assets that are currently in place. Similarly, the operating expenditure in a top-down usually come from the accounts and reflect the cost of operating the assets in place. Bottom-up models however, require an estimate of costs of operating an efficient and new network. Operating costs should be adjusted to reflect this difference.

- Efficiency of the operator. Even assuming that MEA corresponds to the assets actually in place (a common although unlikely assumption in access network models developed by incumbents), it is unlikely that costs actually incurred by the operator in question are the most efficient. Econometric and statistical techniques are sometimes deployed to form a view on the operator's efficiency.

- The age of the asset to which operating costs refer. Bottom up exercises model operating costs associated with first year assets whereas top down exercises model operating costs associated with assets with a variety of ages ("mixed vintage"). This should be reflected in the depreciation profile used which, in a top-down model, should take into account a lower capital charge and higher operating costs associated with old assets (as opposed to a higher capital charge and lower operating costs associated with first-year assets of the bottom-up model).

As a result of these factors, top-down models are likely to produce, *ceteris paribus*, a higher level of operating costs than the corresponding bottom-up models.

4.2.3 Differences in inputs

The term 'inputs' refers to those factors that are not related to the structure of the network and that affect the results. They include assumptions on the cost of capital, the asset life and the price trend. These are considered separately from the methodological factors because:

- a decision on their value can be made independently from a decision on the methodology to be adopted (they should not impinge on the objectives of the regulator); and

- the values they take have a strong impact on the results of the model.

We believe that the most important input differences are: the asset unit costs, the cost of capital, asset lives, the asset price trends and the allocation keys for common costs. Table 4.1 classifies these inputs, on the basis of our assessment of their likely impact on the results.

Table 4.1: Impact of Input Differences

Input	Impact of differences on final results	Discussion
Cost of capital	High	This is potentially one of the most important inputs. This is especially true in the access network where a significant share of costs is related to capital expenditure. However, an agreement from the parties on this input may be less contentious than on other inputs (such as price trends and asset lives).
Asset lives	High	These inputs enter the calculations of annualisation and, out of experience, we believe that they are likely to have a major impact on the final results.
Asset age	Medium	These inputs are used in top-down models when converting historic to current costs. Their impact depends on the price trend of the assets in question.
Price trends	High	These inputs enter both the calculations of annualisation and when converting historic to current costs in top-down models.
Allocation keys for common costs	Low	The importance of allocation keys depends on the choice of the increment. If the increment is considered to be the access network as a whole (as it is likely to be the case) the keys used to allocate common costs are here believed to have a minor impact on the results.
Allocation keys for joint costs	Medium	Allocation keys that are used to allocate joint costs (trench and duct costs, usually an important part of the total cost categories) are here believed to be of medium importance.
Unit costs	High	The equipment prices will have a major impact on costs and some costs — such as trenching — will be specific to the Member State. This means that the costs will depend on the dispersion and density of customers, on the terrain, and on other geographic factors.

5 QUANTIFYING DIFFERENCES IN PRICING METHODOLOGIES

This section will use the information we have from Member States along with other information from our own experience in order to quantify the impact that different methodologies might have on prices. Three case studies are provided.

The first case study examines ULL tariffs in Italy and tries to quantify the impact of moving from a historical cost approach to a benchmarking approach and then to one using current costs. We believe that this will be important in showing the impact that CCA might have on ULL prices.

The second case study reviews the Danish experience and explores the difference between costs derived through a top-down model and those derived using a bottom-up model. This shows the potential for large differences due to the use of different approaches and demonstrates the need for regulatory authorities to review in a critical and comprehensive way the results coming from top-down models.

The third case study reviews the evolution of the ULL charge in Germany, looking in particular at the potential for Deutsche Telekom to act anti-competitively.

5.1 Case Study 1: ULL Pricing in Italy

5.1.1 Background

Agcom, the Italian Telecommunications NRA, has the power to regulate unbundled access to the local loop of the incumbent operator, Telecom Italia (TI), through national law no. 249/97. Telecom Italia is required to publish a Reference Interconnection Offer (RIO) for access to other licensed operators to the infrastructure of its separated businesses. Access has to be granted according to the principles of cost orientation, transparency and non-discrimination.

Agcom's Decision 2/00/CIR specifies the detailed obligations that Telecom Italia is required to follow when filing the corresponding RIO regarding access to unbundled elements of the local network. In particular, Article 8 discusses the use of fully allocated historic costs when determining the wholesale charge to the local network.

As indicated in the answers to the Commission document, COCOM 03-05, Agcom is planning to move to long run incremental costs making use of current costs. In particular, Decision Notice 399/02/CONS requires TI to prepare its regulatory accounts using a CCA methodology for interconnection services; however, the criteria and methodology for the application of CCA to the access network are still under evaluation.

5.1.2 ULL charges in Italy

The following table summarises the evolution of Telecom Italia ULL monthly rental in the period 2000 to 2003.

Table 5.1: Telecom Italia Copper Pair Monthly Charge for the Period 2000-2003

	2000	2001	2002	2003
ULL monthly charge (€)	11.5	11.6	10.8	8.3

The change in the charge between 2000 and 2003 is not due to changes in the historic costs incurred by TI. In Decision Notice 03/03/CIR, Agcom states that:[18]

> The short-run results of the unbundling of the loop have not been entirely satisfactory, in so far as the number of unbundled lines represents, at the moment, an irrelevant percentage of the total number of subscribers to the fixed network.

The Notice goes on to assess a number of factors that have been identified by other operators during the consultation exercise to explain the high ULL charge. In particular, other operators argued that the access network of TI is over-dimensioned in terms of copper pairs when these are compared to the number of lines in service. The level of spares is considered to be excessively high and this would affect capital costs associated with copper cable. Agcom has shared this view.

Agcom also suggests that it would be appropriate to bring forward some of the efficiency improvements that TI will presumably achieve in the time horizon during which ULL charges will be regulated through the price-cap mechanism.

Agcom does not quantify the possible reductions associated with these two factors, but it does claim that they as a whole would be enough for TI to offer a wholesale charge that is in line with the best practice in Europe. Best practice in Europe has been identified as being ULL charges in Denmark, i.e. € 8.30 per copper pair per month,[19] which corresponds to the RIO of TI for ULL in 2003.

The change in prices between 2002 and 2003, therefore, is not due to changes in historic costs incurred by TI, nor a move from historic costs to current costs, but the consequence of considerations made by Agcom as described above. It may, however, be interesting to explore the possible impact of moving from historic costs to current costs if such a move were considered desirable.

5.1.3 Estimating the impact of moving to a current cost methodology

This case study presents an illustration of the impact of moving from historic cost valuation of assets to current cost valuation.

[18] Europe Economics' translation of the penultimate paragraph of page 9 of Delibera n. 03/03/CIR.
[19] This charge excludes connection charges.

Step 1: Obtaining historic costs by asset category

In order to provide an illustration — and it can only be an illustration in the absence of much more detailed data — of the impact on ULL charges of moving asset valuation from an historic to a current standard, our starting point is the total figure of the ULL part of the access network, as this has been obtained from the ULL charges regulated by Agcom for 2000.

The total cost figure (the starting point of our analysis) is estimated by taking the monthly charge estimated using HCA valuation, 22,200 Italian lire; multiplying it by twelve to obtain an annual figure; then multiplying by the total number of lines, 25 million, as the number of active loops in 2000.[20] This gives us 6,660 billion lire, which would be the annual cost of providing a ULL service for all the lines in Italy.

Answers to the COCOM questionnaire allow to split the ULL network costs (i.e. 6,660 billion lire) into the following cost categories: direct capital costs; direct operating costs and common and joint costs. By applying those shares to the figure derived for the total costs in 2000, we obtain the results shown in the table below.

Table 5.2: TI Historic Costs for 2000

Broad categories	Historic Costs (billions of lire)
Direct capital costs	3,064
Direct operating costs	2,331
Common and joint costs	1,265
Total	6,660

Step 2: Moving from historic to current cost valuation

The adjustment from historic to current costs will apply to our estimates of the capital costs, since operating costs are incurred on a year-by-year basis and hence are "current" almost by definition.[21]

Consequently, in moving from historic costs to current costs, operating costs (including depreciation in this example) will remain unchanged, whereas capital costs will be subject to change. An assumption is required in order to allocate common costs to the capital charge and to operating costs and we assume an equal split between the two categories.

[20] Source: page 12 of the Decision Notice 03/03/CIR. We use this figure as a proxy of the number of loops, rather than lines, in 2000. We are aware that the number of loops might exceed the number of lines (due to the fact that some lines need more than a copper pair), but this might be counterbalanced by the fact that we are using 2002 lines as a proxy of 2000 copper pairs.

[21] The adjustment to current costs operated in this report does not make any assumptions about whether existing assets represent the modern equivalent asset, nor does it make any adjustments to operating costs to align them with the costs that would be compatible with the current cost asset base. These factors would be likely to lower the current-cost estimate for ULL in Italy from that in this section.

The split of the estimated total costs for 2000 into capital costs, operating costs and common costs is only a first step. The next step is to attribute those capital costs to the different network elements as different cost categories will have different ages and different price trends. The allocation of total annual costs for 2000 to network elements could be done on the basis of costs from the data available in Denmark. However, there are two limitations with this approach. First the mix of assets will differ from one Member State to another. Second, the mix of costs in Denmark is based on current costs rather than historic costs meaning that the 2000 costs for Italy may be over-allocated to assets experiencing positive price trends.

Table 5.3: Breakdown of Capital Costs into Cost Categories

	Proportions of total cost (percent)	Europe Economics estimate for TI (billions of lire)	Age (Years) (Europe Economics estimate)	Assumed Asset Price Trend (per cent) (Europe Economics estimate)
Trench & Duct	39.4	1,658	20	6%
Mini duct from street to NTP	7.8	328	10	5.0%
Copper Cables	20.50	863	5	0.9%
Cabinets	0.7	29	8	2.0%
Distribution points	0.6	25	8	2.0%
RCU MDF	0.4	17	5	-1.1%
RCU Siteoverheads	3.4	143	5	-3.2%
Total Direct Capital Costs	**72.8**	**3,064**		
Common Capital Costs		633	5	2.0%

The first data column of the table above gives the proportionate breakdowns from the Danish figures. Using these proportions and our total figure for capital costs, which is (3,064 billion lire, based on historical data as explained above), we obtain estimates for Italy. For example, trench and duct comprises 39.4 per cent of total expenditure, of which 72.8 per cent was Capex. This means that 54.1 per cent of Capex was devoted to trench and duct. Then 54.1 per cent of 3,064 billion lire is 1,658 billion lire, giving us our lire amount for trench and duct in the second data column.

It is important to emphasise that we do not believe that this mix of assets reflects the situation in Italy. The example is presented as a way of illustrating — using publicly available data — the impact of moving from historic costs to current costs.

The third data column gives estimates Europe Economics used for the ages of the assets. One of the main factors in the adjustment of capital expenditure is the average age of the assets in question: the older the asset, the more acute the adjustment (assuming a non-zero price trend). We did not have access to data on the actual age of assets, and thus had to produce figures that may be representative of the situation in Italy. However, the actual ages may differ materially from

those we have assumed. Below we discuss our analysis of the sensitivity of our results to these assumptions.

Similarly, the fourth data column gives estimates that Europe Economics has used in previous projects for the price trends of the assets. The estimate of 6 per cent for Trench and Duct corresponds to the compounded annual inflationary trend in Italy in the last 20 years; it appears high but it is not out of line with experience in a number of EU Member States.

Given a figure for the historic costs, and the ages of the assets in question, we can obtain a figure for the current costs from the following formula:

$$\text{Current Costs of Asset} = (\text{Historic Costs of Asset}) \times [(1 + \pi_k)]^{(\text{age of asset})}$$

where π_k is the price trend for this type of asset over the lifetime of the asset (including both the average inflation rate within the country, and any real price trend of the asset).

Results

Table 5.4: Comparison of Historic and Current Costs by Category.

	Historic cost	Age (Years)	Assumed Asset Price Trend (per cent)	CC/HC	Current cost
Capital Costs					
Trench & Duct	1,658	20	6	3.21	5,318
Mini duct from street to NTP	328	10	5.0	1.64	537
Copper Cable	863	5	0.9	1.05	904
Distribution points and cabinets	54	8	2.0	1.17	64
RCU MDF	17	5	-1.1	0.95	16
RCU Siteoverheads	143	5	-3.2	0.85	122
Total Capital Costs	3,064			2.27	6,960
Operating Costs	2,331	(unchanged)			2,331
Common					
Common Capital Costs	633	5	2.0	1.12	711
Common Operating Costs	633	(unchanged)			633
Total Common	1,265			1.06	1,344

The Table below gives our summary results for the comparison of Current and Historic costs.

Table 5.5: Summary Results (billions IT lire)

	Historic Costs	*per cent*	Current Costs	*per cent*	Difference (CC as percentage of HC)
Capital	3,064	46	6,960	65	227
Operating	2,331	35	2,331	22	100
Common	1,265	19	1,344	13	106
Total	**6,660**		**10,635**		**160**

The hypothetical ULL charges based on our estimate of current costs, can then be calculated by dividing the total valuation at the network level by the number of copper pairs in 2000 (which has been assumed to be 25 million). The table below summarises the result of our exercise at the ULL monthly charge level.

Table 5.6: HC Charge for 2000 (from TI RIO) and Hypothetical CC Charge

	2000 HC	2000 CC
ULL monthly charge (€)	11.5	18.3*

** Europe Economics estimate and provided as an illustration only.*

5.1.4 Sensitivity analysis

Two sensitivity analyses have been performed: one which specifically assumes a different price trend for trench and duct in the last 20 years, and another which analyses the impact of different price-trends and age assumptions on all the assets.

Changes to the price trend of Trench and Duct

The Table below provides summary results for the comparison of current and historic costs obtained assuming an asset price trend of 3 per cent for trench and duct, as opposed to the 6 per cent assumed above.

Table 5.7: Summary Results (billions IT lire)

	Historic Costs	*per cent*	Current Costs	*per cent*	Difference (CC as percentage of HC)
Capital	3,064	46	4,637	56	151
Operating	2,331	35	2,331	28	100
Common	1,265	19	1,344	16	106
Total	6,660		8,312		125
ULL monthly charge (€)	**11.5**		**14.3**		**125**

This table shows that even with a relatively low value for the asset price trend (3 per cent), one comes to a significant difference in costs over time (25 per cent). This emphasises the need for a more detailed analysis of the sensitivity of inputs.

5.1.4.1 Changes to the price trend and ages of all assets

Table 5.9 below provides an indication of how sensitive the results provided in Table 5.5 (i.e. ratio between current and historic cost estimates) are to our assumptions about the ages of assets and their price trends.

Table 5.8: Sensitivity Analysis

	Effect on ratio of total CC to HC estimates	
	Age	**Trend Asset Inflation**
Change	**+1 year**	**+1 per cent**
Trench & Duct	6.88 per cent	19.91 per cent
Mini duct from street to NTP	0.41 per cent	0.80 per cent
Cable, RCU_PDP-SDP	0.08 per cent	0.41 per cent
Cable, copper SDP-NTP	0.05 per cent	0.27 per cent
SDPs and PDPs, circuit board + jointing	0.01 per cent	0.04 per cent
DP cabinet	0.01 per cent	0.04 per cent
RCU MDF	0.00 per cent	0.01 per cent
RCU Site overheads	-0.06 per cent	0.10 per cent
Common Capital	0.21 per cent	0.52 per cent

Figures given are changes in total current costs as a percentage of historic costs.

It is clear from Table 5.9 that the most sensitive component is the trench and duct figure. Each year our assumption about the age of trench and duct is wrong changes the ratio between current and historic costs for that item, which in turn makes 6.88 percentage points difference to the ratio of total CC to HC.[22] This sensitivity of trench and duct suggests that obtaining an accurate figure for the ages and price trends of this item should constitute a core part of any current cost based assessment.

The reason trench and duct is the most sensitive element is because of two characteristics:

- trench and duct is the largest component (at 54 per cent of historic costs).
- trench and duct is the oldest component (at 20 years).

Finally, it is worth noting that the example presented here may overstate the impact of a move to current costs from historic costs as the impact of such a shift will be starker when considering

[22] So, current costs would be 1.84 times historic costs instead of 1.77 times as much (i.e. the 6.88 percentage points difference), as in Table 5.5, if the trench and duct is 21 years old instead of 20 years. Similarly, each percentage point error in the price trend for trench and duct makes 19.91 percentage points difference.

costs at a gross replacement cost (GRC) level. It is important, therefore, for regulatory authorities to conduct their own analysis using country specific data and to consider other factors (such as holding gains and losses) which have not been considered in this relatively simple example.

5.2 Case Study 2: ULL Pricing in Denmark

This Case study reviews the Danish experience and quantifies the difference between costs derived through a top-down model and those derived using a bottom-up model. This shows the (vast) potential for differences using different approaches and demonstrates the need for regulatory authorities to review in a critical and comprehensive way the results coming from top-down (and bottom-up) models.

5.2.1 Background

This case study reports on one part of a comprehensive process to set LRAIC-based charges for interconnection services and local loops in Denmark from 2003.

As part of that process, the incumbent operator, TDC, was required to develop a top-down model. At the same time, new entrants were required to develop a bottom-up model. The legislation stated that the results of the bottom-up cost analysis shall be checked and modified by comparing these with the results of the top-down cost analysis so that the final LRAIC pricing methods appear as a consolidated balancing of the results of the two cost analyses. Such consolidated balancing was undertaken by the Danish NRA, IT- og Telestyrelsen (ITST), following consultation with the parties.

The objective of reconciliation can be described as “closing the gap” between the two models. This means that the most important sources of difference between the two models need to be identified and quantified.

The gap between the results of the top-down and bottom-up models for access in Denmark was very large. The top-down model (TD Model) for example, produced a charge for the annual rental for a copper pair of around 2,300 Danish Kroner. The bottom-up model (BU Model), on the other hand, produced a charge of 237 Danish Kroner.

In the reconciliation report, ITST identified five main sources for these differences:

- Differences in Gross Replacement Costs (GRCs). These comprise differences in equipment unit costs and equipment requirements.
- Differences in the annualisation methodology and inputs actually used to annualise the GRCs.
- Differences in the direct or indirect operating costs associated with the assets needed to provide ULL services.
- Differences in the costs associated with the operation of the business as a whole (overheads).

- Differences in allocation keys between the different increments and, within each increment between the services that make up the increment in question.

Given that these two models are meant to estimate costs associated with serving the same demand, they would theoretically differ only with respect to the different methodological factors and the inputs used; however, the two models, perhaps inevitably, take different views also on the network factors and this has in turn an impact on the equipment requirements (which affects GRCs).

This case study is therefore useful to shed light on the range of reasons for differences in ULL estimates and gives an indication on the relative importance of each factor when an exercise of this kind is undertaken. However, it is important to bear in mind that this is only a case study and what it has proved to be important in the Danish process might not prove as important in other Member States.

5.2.2 Quantifying the Differences

5.2.2.1 Overall results

The table below shows which of the factors listed in the section above matter most in explaining the difference between bottom up and top down ULL charges, within the Danish exercise.

Table 5.9: Summary of the Original Reconciliation Exercise (Annual Charges)

	BU original	GRC	Annual.	Operating	Overheads	Allocations
2-wire copper (DKK)	237	440	1,453	1,775	1,813	2,310

Source: Reconciliation Report – differences between the top-down and the bottom-up cost analyses, IT- og Telestyrelsen – 8 May 2002 < http://www.itst.dk/wimpblob.asp?objno=98633095>

The table above has been constructed starting with the ULL charge estimated by the BU model (237 DKK per year). This figure has then been adjusted, step-by-step, to make it comparable with the result of the top-down exercise (around 2,300 DKK per year). The remaining figures show the results that would be produced by the bottom-up model, when adjusted for the different top-down inputs/assumptions.

So, the number shown in third column (440) has been obtained by applying to the original bottom up model, the same asset unit cost and requirements as the ones assumed in the top-down model. Analogously, the number shown in the fourth column (1,453) has been obtained by adopting in the bottom-up model, on top of the top-down asset unit cost and requirements, also the top-down assumptions on annualisation (e.g. cost of capital, asset life, price trend). The number shown in the fifth column has then been obtained by adjusting the bottom-up model, on top of the adjustment for top-down asset unit cost, asset requirements and annualisation assumptions, for the top-down assumptions on operating costs and so on to take into account also differences in overheads and, finally, allocation keys.

From the table above, we can draw two conclusions. First, the single most important factor for the difference between bottom-up and top-down results in the Danish exercise has been the

annualisation methodology and its application. Second, every single factor (apart from the adjustment for overheads) is significant in explaining bottom-up and top-down discrepancies.

The following sections discuss the impact of different assumptions regarding trench and duct as well as the impact of the different inputs used in the annualisation methodology.

5.2.2.2 Differences in assumptions regarding trench length

The different assumptions regarding the amount of trench and duct in the network made in each model are shown in the table below.

Table 5.10: Summary of the Reconciliation Exercise in Denmark for Trench and Duct

	Bottom up value	Top down value
Overall modelled length*	101,724 Km	193,423 Km
Allocation of overall trench length to access	89,141 Km	190,854 Km

Source: Europe Economics with information from ITST Reconciliation Report.
** Overall modelled length refers to the trench for the access network and the trench that is common between access and core.*

The following points are worth noting:

- The top-down model assumes almost double the amount of length of trench for the network as a whole (i.e. encompassing both the core and the access increments).
- The top-down model assumes that only a minor percentage of the overall amount of trenches (less than 3,000 Km out of a total of more than 190,000 Km) is common between the core and the access part of the network, whereas the bottom-up model assumes a much greater extent of trench sharing between the two increments.
- This exercise has shown that the modelled amount of trench and duct (attributed to the access part of the network) is more than two times in the top-down model than in the bottom-up model.

IT-og Telestyrelsen examined the difference in trench length further and a revised amount for trench length was used in the final hybrid model. The exercise, however, highlighted the benefit of bottom-up models — and particularly of reconciliation — to identify differences in planning and design rules and demonstrate that different assumptions regarding major assets such as trench can be technically and economically feasible.

5.2.2.3 Annualisation

Once GRC differences are reconciled, the next step is to reconcile differences in the annualisation methodology and its related inputs.

The reconciliation report lists a table with the annualisation shares for the different classes of assets under the different assumptions on methodology and inputs. An extract from that table is reported below.

Table 5.11: Reconciliation of the Annualisation Rates by Different Asset Categories

	Original BU estimates	Using top down annuity formula	Using top down WACC	Using top down price trends	Using top down asset lives
Trench and Duct	4.5%	4.7%	8.9%	20.3%	21.6%
Copper	6.5%	6.9%	11.1%	19.6%	21%
Distribution points	8.9%	9.3%	13.7%	19.7%	21%

Source: Europe Economics with information from ITST Reconciliation Report.

The adjustments are described below.

The second column of the table lists, by asset category, the percentage of the Gross Replacement Cost that is attributed to the annual capital expenditure in the bottom-up model. This is assumed to include both a depreciation and a cost of capital charge. So, in the bottom-up model 4.5 per cent of the GRC cost for trench and duct is annualised to cover both the depreciation and the cost of capital associated with that asset category.

Table 5.11 shows how the percentage of gross replacement cost then would be annualised in the bottom-up model increases when the formula is changed to incorporate — one after another — the inputs used in the top-down model.

The third column reflects differences in the formula used in the two models. The bottom-up model uses the PMT function of the Excel software whereas the top-down model uses the standard tilted annuity formula.[23]

The remaining columns reflect different assumptions on the inputs entering the formula: (in order) weighted average cost of capital, price trend and asset lives.

- The higher the cost of capital, the higher the annualisation rate.
- The higher the price trend, the lower the annualisation rate. If the price trend is negative, than the annualisation formula recoups more in the early years (higher percentages) than in the later years of the asset (this is because the asset is assumed to lose value and it is therefore appropriate to discount it more heavily at the beginning of its life); the other way

[23] The PMT function returns the periodic payment for an annuity based on constant payments and a constant interest rate when payments are due by the end of the year. The results obtained are the same ones which would be obtained by applying the standard formula for a tilted annuity, in the absence of a price trend. The different treatment of a price trend, however, leads the PMT function to overestimate the annualised value based on the tilted annuity formula for negative price trends and underestimate it with positive price trends.

around if the price trend is assumed to be negative. The bigger, in absolute value, the price trend, the more tilted the depreciation rate.

- The shorter the asset life, the higher the annualisation rate.

The two factors that have the greatest impact on the annualisation rate are, not surprisingly, changes in the cost of capital and changes in price trends. The weighted average cost of capital (WACC) in the top-down model is 14.5 per cent compared to 9.3 per cent in the bottom-up model reinforcing an earlier finding of the study that differences in opinions on the parameters underlying the cost of capital calculation can have a significant effect on costs. Price trends are very different in the two models, in many cases having different signs. Almost all of the network elements in the top-down model have a negative price trend (high annualisation rates), while many of the important elements in the bottom-up model (such as trench and copper) have a positive price trend (low annualisation rates).

Asset lives affect the annualisation rate, but less than the WACC and the price trends.

5.2.3 Conclusion

This case study shows that although top-down and bottom-up models are both trying to model the costs of an efficient new entrant, they can produce different results. Such a divergence could, however be minimised to some extent by prior agreement on a number of key areas such as cost of capital and depreciation methodologies (and associated inputs). A reconciliation exercise between the two models in order to identify and quantify these differences is crucial in improving the robustness of both models and in exposing many of the inappropriate assumptions that may be found in such models.

5.3 Case Study 3: ULL Pricing in Germany

Deutsche Telekom (DT) was required to offer its competitors fully unbundled access to the local loop, with effect from June 1997 following a complaint lodged by Mannesman Arcor, which came after unsuccessful negotiations with Deutsche Telekom between November 1996 and March 1997. The requirement was imposed by the Federal Ministry of Posts and Telecommunications in May 1997; at that time, no such obligation yet existed under Community law. Since 1 January 2001, when Regulation (EC) No 2887/2000 entered into force, local-loop unbundling has also been mandatory under Community law.

Under German telecommunications law, charges for access to the local network must be cost-oriented and must be authorised in advance by the National Regulatory Authority, RegTP.

The following table describes the charges sought by DT and authorised by RegTP since March 1998 (when the first ULL charges were set).

Table 5.12: History of ULL Charges in Germany

	RegTP (authorised)		DT (sought)	
	Monthly (€)	New connection: one-off (€)	Monthly (€)	New connection: one-off (€)
March 1998 (a)	10.56	309.84	14.73	309.84
June 1998			24.16*	384.58*
January 1999			19.07	224.26
February 1999 (b)	12.99	100.5		
January 2001			17.40	119.51
March 2001 (c)	12.48	92.59		
11 April 2002		81.12		
30 April 2003 (d)	11.80			

The Decision Notices relevant to the monthly charges are:

(a) BK 4a 1130/E23.12.97

(b) BK 4e-98-024/E 21.09.98

(c) BK 4a-01/001/E 19.1.2001

(d) BK 4a-03-010/E 19.2.2003

**Application withdrawn*

In March 1998, the regulatory authority for the first time authorised monthly net charges for unbundled access to DT's local loop at a level of €10.56. DT had requested authorisation for a monthly charge of €14.73 for the rental of a local loop, calculated on the basis of a "traditional" cost accounting system. DT had also applied, for opening a new connection, for a one-off charge of €309.84, which the NRA authorised.

At this time, RegTP also asked DT to submit a more detailed cost calculation by the middle of 1998, using the cost accounting system DT had recently introduced (INTRA). It also told DT that the corrections ought to bring the charges well below €10.

In June 1998, DT having learnt that the regulatory authority intended to increase the monthly charge to €11.86, withdrew its application for a charge of €24.16, on the recommendation of the Federal Minister for Economic Affairs. The same day the regulatory authority decided to extend the validity of its provisional authorisation of 9 March 1998 (i.e. the monthly ULL charge of €10.56), which was now to continue until 30 April 1999.

In January 1999, DT lodged a new application seeking authorisation for a monthly charge of €19.07 and one-off charges of €224.26. In February 1999, the Authority rejected DT's application and authorised charges of €12.99 and €100.5 respectively.

Along with the January 2001 application (seeking authorisation for monthly and one-off charges equal to €17.40 and €119.51), DT submitted calculations of the costs of these services based on its own internal cost accounting system and expressly stated that under the relevant rules of German law these were the only calculations that could be considered for purposes of the authorisation of charges.

In March 2001, the regulatory authority rejected the charges sought by DT in its January application and based its authorised charges (i.e. €12.48 for monthly rental and €92.59 for a straightforward new connection) on the basis of a bottom up model developed by consultants, which set out to identify the long-run incremental costs of unbundling.

In April 2003, RegTP further reduced monthly charges to €11.80.

Through the 21 May 2003 Decision, the DG Competition Commission, on the basis of a number of complaints lodged by a number of German local and regional telecommunications operators, levied a substantial fine on DT for unfair pricing (price squeezing) in relation to unfair pricing contrary to Article 82(a) of the EC Treaty.

5.3.1 Lessons to be learnt

We believe that the German case is interesting for a number of reasons.

5.3.1.1 Inputs matter

Up to March 2001, when a bottom-up model was produced for the purpose of calculating ULL charges, the charges authorised by RegTP and the ones submitted by DT were allegedly calculated on the basis of the same information (DT's accounts) and the same methodology (cost base and cost standard).

Despite this, it is quite clear from the table above how the two sets of figures differ from each other. This suggests that there is a substantial level of judgement involved in deriving cost estimates and the figures submitted by the incumbent should be subject to scrutiny.

5.3.1.2 Avoid relying on one methodology

The monthly charge of €11.80, which takes effect from May 2003, has been estimated making use of three main tools: the model developed by its consultants, the documentation provided by DT and an international benchmarking exercise.

The consultant's model seems to form the basis for the cost estimates associated with the capital investments of the local loop. In an access network, the capital cost (including depreciation) corresponds in most of the cases to the bulk of total costs. These cost categories are well suited to be estimated through a bottom-up approach. This would take into account demand and topographic characteristics of the network under considerations and estimate, accordingly, an efficient level of equipment (and therefore the associated depreciation charge) and the associated cost of capital. However, bottom-up models may not be particularly good at estimating some classes of operating and indirect costs and that the information in the accounts of the current network operator might provide useful insights when estimating these cost categories.[24]

[24] It is important to bear in mind that the costs in the incumbent's accounts, although providing a useful insight, do not necessarily correspond to the ones of a hypothetical new entrant.

Once the ULL charge is estimated making use of both the bottom-up model and the documentation from the incumbent, RegTP undertakes an international benchmarking exercise. We believe that this is interesting for a number of reasons.

- A benchmarking exercise is still considered by the German NRA to be a valuable cross-check of the estimates obtained through analytical models.

- The average monthly rental charge over the considered EC countries is € 10.90. However, RegTP decides to exclude those countries whose situation, in terms of the number of unbundled loops, is not considered to be steady yet (only very few loops unbundled). They therefore end up including in their benchmarking sample only the following countries: Denmark, Finland, Italy, the Netherlands and Austria. The average monthly ULL charge for these countries is € 11.52.

- The Decision Notice mentions that the incumbent has also provided some figures of international benchmarking of ULL charges from the US. These average € 23.54. The regulator dismisses these figures since DT has presented data on tariffs related to the wholesale offering of digital rather than analogue lines.

6 AN INCREASING TREND TOWARDS LRAIC TO PRICE ULL

6.1 Introduction

Section 2 showed that many EU Member States are now using a long run incremental costing methodology to set the wholesale price of unbundled local loops. In fact, only Ireland, Italy, Sweden, the Netherlands, Finland[25] and Belgium (for raw copper) are not yet using LRAIC. However, even some of them are planning to implement, or are in the process of implementing LRAIC.

A LRAIC methodology may lead to a higher price for ULLs than a methodology that estimates and allocates costs in a different way and one that relies on the use of historic costs. This is mainly because the use of a long run time horizon assumes that all assets are variable and, therefore, that the costs of long-lived assets such as trench and copper cables are "re-estimated" and charged to ULL users. Another reason is that the use of a forward-looking cost concept such as current costs will, where costs are rising as they would tend to be for many of the most important assets in the access network, lead to higher asset valuation and consequently higher wholesale prices.

Given the potential for an increase in the price of ULL when migrating to a LRAIC methodology using current costs, this section examines why Member States are implementing LRAIC. It then assesses whether the use of a LRAIC methodology is appropriate for access networks and whether there are any alternatives that could help meet the Commission's objectives identified in Section 7.

6.2 Why LRAIC?

Given that the majority of the Member States are either already using or are planning to use the LARIC approach to estimating ULL charges, it is worth revisiting the reasons why some regulatory authorities favour the use of LRAIC. This section presents the view of three regulators on the issue — Oftel (UK), EETT (Greece), and ComReg (Ireland).

[25] More precisely, the cost standard used Finland is company specific.

6.2.1 Oftel

In a statement issued by the Director General of Telecommunications,[26] Oftel stated its reasoning for choosing "LRIC+" as the pricing regime for the local loop. The principal reasons were that a LRIC+ based charge reflects replacement cost, which is the economic value of a line in a market where loops are competitively supplied. In a competitive market the owner of the infrastructure would not be able to set prices above replacement cost, since, if it did, entry would be induced and the price of the loop would be driven back down to a level reflecting replacement cost. Thus a price set on the basis of LRAIC+ reflects the earning power of the loop in a competitive market, irrespective of the services carried over it. Oftel considers that such an approach approximates the pricing behaviour that would prevail in a competitive market.

6.2.2 EETT

EETT, the Greek NRA, in Decision 211/3 stated that the pricing of both ULL products should be such as to achieve the following:

- The promotion of effective, long-run competition;
- Sending of economic signals that promote effective investment decision making in the long-run;
- The avoidance of discrimination against the recipients of the services;
- The provision of incentives for the introduction and effective use of new services;
- Adequate transparency; and
- Ensuring that the incumbent can recover the respective cost, allowing, at the same time, for a reasonable return.

6.2.3 ComReg

ComReg and its predecessor, ODTR have repeatedly argued that Long Run Incremental Cost provides the appropriate basis for the computation of cost-oriented ULL prices[27]. ComReg believes that the LRAIC approach:

- seeks to maximise customer benefit by promoting efficiency and sustainable competition (it does this by setting a price for the service that reflects what it should cost to provide); and

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[26] "Access to Bandwidth: Delivering Competition for the Information Age", November 1999

[27] ODTR 00/30 of April 2000 – Decision Notice D6/00 – directing that *"LRIC forms an appropriate basis for calculation of prices for ULL",* position 7.3 ODTR D4/02

- takes account of the investment made by the operator and allows a rate of return on reasonable capital employed. It does this by setting a cost of capital consistent with the nature of the regulatory regime.

6.3 Approximating a Competitive Price in a Regulated Industry

Clearly, LRAIC has been seen as a way of mimicking the result of a competitive market. Competition provides incentives that promote efficiency — both in terms of production and (under appropriate circumstances) allocation. However, it can be difficult to achieve competition in some markets, such as that for local loops. This is partly because of the high proportion of fixed and sunk costs and, in particular, because the nature of these costs typically mean that it will be more efficient for only one operator (usually an incumbent who was the "first mover") to serve the market.

The theoretical ideal of new entrant pricing is attractive, since it sets regulated prices to match the prices expected to occur in a competitive market, without distorting efficiency incentives by relying on the actual costs of the dominant operator. As such, it can be described as an attempt at "mimicking" competition through regulation, and is often used to facilitate a transition from monopoly to competition (see Box below).

Box: Using LRAIC to establish the price of a contestable market

The concept of LRAIC is closely related to that of a new entrant price, i.e. of annualised cost under a current cost accounting methodology, with an allowance for operating expenditure that reflects the most efficient working practices that would be available to a hypothetical new entrant. The assessment of the cost of a new entrant should include an annualised charge in respect of depreciation and a return on capital employed. In some cases, a contingency margin should be allowed to cover any business risks that would be borne by a new entrant but that are not included in the estimated cost of capital.

LRAIC, by using current costs rather than the costs actually incurred by the incumbent, is considered to be forward-looking. Indeed, the term current cost is often used interchangeably with forward-looking cost, a term used by Oftel in the UK and the FCC in the US to explain the methodology. For example, Oftel argued in their Consultative Document to set network charges from 1997 that "Forward-looking costs constitute the appropriate cost base for interconnection charges because they reflect resource costs and are consistent with the workings of a contestable market. Ideally for economic efficiency, the prices of retail services should be set in a way which encourages consumers to take account of the resource costs of their purchasing decisions. Operators would be encouraged to set efficient retail prices if they could purchase a major input (interconnection) at a charge that was set by reference to the cost of the resources consumed by its provision."

This was also the reasoning of the European Commission in recommending LRAIC as a way of setting charges for interconnection to core networks. The Commission Recommendation of 8 January 1998 on interconnection in a liberalised telecommunications market (Part 1 — Interconnection pricing) was quite explicit that such a methodology was consistent with cost orientation. The Commission recommended that "Interconnection costs should be calculated on the basis of forward-looking long run average incremental costs, since these costs closely approximate those of an efficient operator employing modern technology. Interconnection charges which are based on such costs may include justified 'mark-ups' to cover a portion of the forward-looking joint and common costs of an efficient operator, as would arise under competitive conditions."[28]

However, the local loop exhibits different characteristics — both in terms of cost and the likelihood of effective, sustainable competition — than the core network, and it is not certain that a LRAIC methodology will be appropriate to set ULL prices. This is for two reasons.

- First, a LRAIC methodology may not produce a charge that is capable of "encouraging efficient investment in infrastructure" as required in Article 8 of the Framework Directive.[29]
- Second, a LRAIC methodology may produce a relatively high charge and this may not be consistent with the Commission's objectives of "substantially lowering the costs of using the internet" and of providing "maximum benefit" in terms of price to end users.

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[28] The link between the recovery of joint and common costs in a costing model and the way they would be recovered in a competitive market is tenuous, but we will leave that debate aside for the purposes of this study.

[29] Although in the case of shared access – or more generally, if the increment is defined narrowly enough – LRAIC can produce low charges, but this is because they exclude many of the fixed costs which are covered by other services and not considered part of the more narrow "increment".

These points are addressed below.

6.3.1 Does LRAIC encourage efficient investment in infrastructure?

The way that regulatory authorities attempt to encourage efficient investment in infrastructure is by setting prices capable of providing the appropriate "build or buy" decisions. Such decisions will be distorted towards inefficient outcomes if prices are set either "too high" or "too low". Setting prices "too high" may encourage potential entrants to build their own networks, replicating resources in an inefficient way, rather than lease (or buy) parts of the network from the incumbent. Conversely, setting prices "too low" could lead to entry solely through "buying" of loops from the incumbent at prices which means that the incumbent may no longer invest in or even maintain their network. There would be a danger that there is no investment in alternative infrastructures and no long-term infrastructure competition.

It is not clear that a LRAIC methodology, in the way that it has been applied for ULL is, however, capable of providing clear or useful build or buy signals to new entrants. This is for a number of reasons.

First, a LRAIC estimate for ULL only produces an estimate of the costs of efficiently reproducing a copper-based access network (although top-down models rarely include the necessary efficiency adjustments). This, however, may not be the relevant benchmark for the "build or buy" decision. New entrants are unlikely to reproduce a copper based network similar to the one that has already been rolled out by the incumbent. Instead, they will roll out the technology that is most appropriate to the areas they serve (for example, also using fibre in urban areas and radio in rural areas). It is against this benchmark (that is, the cost of designing an efficient new access network using a mix of technologies to meet demand in different areas at lowest cost) that new entrants will make their build or buy decision.

In other words, a LRAIC charge based on the costs of reproducing a copper network is useful only to calculate the costs of a ULL product based on copper and, therefore, to allow the incumbent to recover the costs of ULL. It is not necessarily capable of providing any useful signals to encourage efficient entry into the access network.

Second, the lack of material technical change for many of the assets in the access network will mean that incumbents will rarely make MEA adjustments when revaluing assets. Instead, they will simply convert existing assets from historic costs to current costs. Such an approach, while possibly consistent with a very narrow interpretation of current costs, cannot be said to produce an outcome that is consistent with a competitive market. Indeed, the European Commission has defined current costs in a wider sense as the costs of building an efficient modern equivalent infrastructure and providing such a service today.[30]

Third, geographic averaging means that, by definition, the LRAIC charge will not actually correspond to the actual costs of ULL in areas where the ULLs are actually purchased. If, for

[30] EU Regulation 26/4/2000 "Commission Recommendation on Unbundled Access to the Local Loop

instance, new entrants would like to purchase loops in urban areas, the price they will face will not even reflect the cost of those loops, but a higher charge reflecting a national average. This may, in fact, bias the decision of the new entrant towards a "build" decision, given that the ULL price is higher than even the incumbent's costs, but even so, the main point is that it cannot encourage efficient investment.

Fourth, the incumbent's ULL charge will reflect the economies of scale enjoyed by an incumbent because of the higher proportion of fixed costs in the access network.[31] These may not be available to new entrants over small volumes, thus distorting — or at least leading to a misleading – build or buy decision.

For these reasons — and in contrast with core networks — LRAIC may not be the most appropriate technique to send meaningful build and buy signals to operators, and therefore, may not able to encourage efficient investment in infrastructure.

6.3.2 Does a LRAIC charge maximise benefits to end-users?

Section 6.3 suggested that new entrant pricing could, in certain circumstances, set prices that might be expected to arise in a competitive market. But a hypothetical new entrant price for a local loop network may not always be the price that best serves the interests of customers. One important case where it would not is that in which there is a monopoly incumbent and the production costs of efficient new entrants are rising over time and there is no allocative efficiency merit in encouraging or facilitating new entry (it is more efficient to stick with the incumbent). In such circumstances setting a price based on an efficient new entrant could lead to an unnecessarily high price meaning that prices may be substantially in excess of what is required to maintain the service (particularly in cases where the incumbent has already been remunerated in the past for some of its long-term capital expenditure).

Indeed, where LRAIC is applied to networks whose assets include an important element — such as duct — that was installed long ago and may have been fully depreciated, and charges are calculated so as to recover the LRAIC, this amounts to asking customers to "pay twice" for the assets, which may be very unlikely to be — or to need to be — replaced.

This is quite likely to be the case for ULL when a LRAIC methodology is used. As shown in the case study on Italy in Chapter 5, the relative weight of trench and duct costs in access networks — and the positive price trend of those assets — means that a ULL charge based on LRAIC will be expected to exceed a charge based on historic costs.

In these circumstances, a ULL charge based on LRAIC is unlikely to translate into a price for customers that will meet the Commission objective of maximising consumer benefits or more specifically, of reducing the costs of using the Internet.

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[31] Economies of scale occur when the average costs of production fall as volumes rise.

The joint ERG consultation paper on remedies states this in a slightly different way. On page 90, for example they argue that:

> "By setting the access price, NRAs are crucially influencing the incentives to invest of the SMP undertaking as well as the alternative operators have incentives to replicate the assets of the incumbent wherever this is economically sensible, taking into account aspects of static and dynamic efficiencies. In particular where the NRA is of the view that assets are not replicable given the currently available technologies, they should ensure that the access price is such that the incumbent has sufficient incentives to maintain and upgrade its network."

The last sentence of the above quote is very relevant when looking at ULL and is explored further in the next section.

6.4 Is there Scope for Alternatives to the LRAIC Methodology?

The Access Directive does not mandate LRAIC, but does state that for the purposes of price control and cost accounting it is appropriate to allow a reasonable return on the capital employed. It also states the value of capital should be adjusted, where necessary, to reflect the current valuation of assets and efficiency of operations.

The Access Directive also does not comment on the appropriateness of different regulatory obligations for different parts of a network. The Directive simply states that where an operator is designated as having significant market power in a specific market as a result of a market analysis, national regulatory authorities shall impose the obligations set out in Articles 9 to 13 of the Directive. These Articles discuss the obligations of transparency, non-discrimination, accounting separation, price control and cost accounting.

In our view for the reasons indicated, it may not be appropriate to regulate ULLs in the same way as interconnection charges to the incumbent's core network. Indeed, the Commission has recognised the need for flexibility with regard to pricing methodologies. For example, paragraph 20 of the preamble states that:

> "The method of cost recovery should be appropriate to the circumstances taking account of the need to promote efficiency and sustainable competition and maximise consumer benefits."

The "circumstances" referred to in the extract above should include the likelihood of a competitive outcome. As stated above, where the company has an inherently sustainable monopoly position there may be few efficiency benefits (associated with innovation and the provision of alternative infrastructure) from prices that match new entrant costs, and these prices may be substantially in excess of what is required to maintain the service.

So the appropriate price setting methodology will depend on the policy objectives and the estimated scope for competition in the provision of local access. If this market itself is expected (or has the scope) to become competitive, then the purpose of regulation is to assist the transition to competition by setting prices that will converge towards the competitive level.

If, on the other hand, the provision of local copper based access is expected to remain a monopoly for the foreseeable future, or if the policy emphasis is on encouraging competition in telecommunication and internet services using the existing local loop, then the constraints placed upon regulation, and the priorities that ought to drive regulation, are different.

6.4.1 Alternatives to a LRAIC Methodology

In circumstances in which there is no policy objective to encourage efficient competition in the provision of the local-loop network or when the assets are not replicable (analogous to the situation accepted by authorities regulating other local distribution networks such as those for electricity, gas and water), the key constraint upon regulation is that the network operator should be able to finance its activities and should have an incentive to do so efficiently (including an appropriate structure of charges). This has several consequences.

- First, the incumbent should be allowed to recover the projected necessary operating, maintenance and renewal expenditure requirements of the network.

- Second, for any investment that is required to enhance or expand the network, the operator must be allowed a reasonable opportunity to earn a competitive return on that investment.

- Third, the operator should be able to earn a reasonable return on past investments appropriately valued (which for a privatised business is not necessarily the replacement cost).

- Any historic assets not fully depreciated would enter into the calculation through their depreciation. And if they needed renewing that would be covered under the second point above.

Whether competition is or is not likely to develop in the provision of local access is a matter of policy as much as a matter of fact, since the form of regulation adopted will in turn affect the scope for profitable investment in building new local access infrastructures. This underlines the need for regulators to be clear about their own policy objectives, the expectations they have for competition in local-access networks, and the way they balance the trade-offs inherent in the Commission's objectives.

The box below considers the approaches that regulators of other regulated industries have followed, e.g. water and sewerage, where there are infrastructure assets similar, in some respects, to those that constitute the access-network infrastructure. Infrastructure assets in the access network, like similar assets in other industries, are typically underground structures which have particularly long lives, especially if subject to appropriate maintenance, and are practically never completely replaced. Such assets can be described as a system in "steady state" because its component parts are wearing out and being replaced, maintaining the serviceability of the system. The definition of a methodology to take into account financing of capital expenditure and depreciation is a feature of regulation in all regulated industries. Different approaches have been followed, due to the specific characteristics of the capital investment programmes and the asset base of each industry.

Box: Experience from Other Sectors for Setting Prices in Sectors with Significant Fixed Costs

There are two main alternative methodologies to define an appropriate annual charge that captures economic depreciation of a capital asset — conventional depreciation and infrastructure renewals accounting.

Conventional accounting methods attribute to each period the cost of capital assets through a depreciation charge, which requires forecasting the economic life of the asset and dividing the expected loss of value over this life.

Infrastructure assets pose a problem for traditional accounting methods based on depreciation charges, which involve allocating the cost of the asset over the expected years of the asset's life. Such methods involve a rather subjective estimate of the useful lives of such long-lived infrastructure assets and therefore may not accurately reflect the actual deterioration of infrastructure assets. Regulators in some industries with similar infrastructure assets, e.g. the water and sewerage industry in the UK, have introduced a different accounting method which overcomes these problems. In particular, depreciation accounting of infrastructure assets has been replaced by renewals accounting.

Renewals accounting entails considering a firm's infrastructure as an indivisible whole, a single system to be maintained in perpetuity, rather than a collection of different assets. A charge is considered annually against profits for the annualised cost of maintaining the system at its current level of operation. This is based on the notion that a system of assets in "steady state" will suffer depreciation of exactly the same amount as the cost of the new components necessary to replace the loss of effectiveness of the systems as a result of the period's usage.[32]

The annual charge is calculated as the average over several years of the forecast infrastructure renewals expenditure required to maintain the system in perpetuity at the same operational effectiveness, i.e. with no loss of value. The long-time horizon over which expected expenditures are averaged serves the purpose of avoiding substantial changes in the infrastructure renewals charge in the short term, e.g. on a yearly basis. Evidence to determine the appropriate level of charge could be partly obtained from evidence of past costs, but a forward-looking approach, which estimates future expenditure plans, is necessary. Future expenditures can be assessed on the basis of long-term asset management plans based on engineering estimates of foreseeable expenditure needs. The costs to be considered should include all the costs involved in maintaining the system at the current level of operation and value such as, for instance:

- the cost of renewing any components that fail during the period;
- the cost of maintenance of any element of the system; and
- the cost of emergency repair to any part of the system.

The length of the period chosen depends on the specific circumstances but it should be related to the company's capacity to plan, manage and carry out the work.

[32] OFWAT (1993) The Long Range Normative Charge for Infrastructure Renewals, RD7/93.

7 SETTING ULL PRICES THAT ACHIEVE POLICY OBJECTIVES

7.1 Introduction

This section provides an overview of the policy objectives set out by the Commission and then discusses how ULL prices can be made consistent with these objectives.

7.2 Policy Objectives

The policy objectives of the Commission are set out in Appendix 3. Article 8 of the Framework Directive sets out the policy objectives underpinning the new regulatory framework. These are stated below:

> "1. Member States shall ensure that in carrying out the regulatory tasks specified in this Directive and the Specific Directives, the national regulatory authorities take all reasonable measures which are aimed at achieving the objectives set out in paragraphs 2, 3, and 4. Such measures shall be proportionate to those objectives.
>
> Member States shall ensure that in carrying out the regulatory tasks specified in this Directive and the Specific Directives, in particular those designed to ensure effective competition, national regulatory authorities take the utmost account of the desirability of making regulations technologically neutral.
>
> National regulatory authorities may contribute within their competencies to ensuring the implementation of policies aimed at the promotion of cultural and linguistic diversity, as well as media pluralism.
>
> 2. The national regulatory authorities shall promote competition in the provision of electronic communications networks, electronic communications services and associated facilities and services by *inter alia:*
>
> - ensuring that users, including disabled users, derive maximum benefit in terms of choice, price and quality;
> - ensuring that there is no distortion or restriction of competition in the electronic communications sector;
> - encouraging efficient investment in infrastructure, and promoting innovation; and
> - encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources."

Leaving aside the objectives relating to spectrum, it appears that three of the objectives above are given greater prominence by the Commission, namely maximum benefit to end users, no distortion of competition, and encouraging efficient investment in infrastructure.

The policy objectives relating to "maximum benefit to end users" and "efficient investment in infrastructure" can be interpreted in different ways. For example:

- Given the characteristics of access networks, and depending on the policy objectives of NRAs, a ULL price that produced the **maximum benefit to end users** is more likely one that is consistent with the alternative to LRAIC discussed in section 6. This suggested that ULL prices should be set at the lowest possible price that still allowed the incumbent to finance their activities (i.e. to efficiently operate and maintain the network and upgrade its investment where necessary).

- Given the cost structure of access networks, it may not be efficient to duplicate a copper-based network. The ART in France, for example, had earlier stated that it questioned the relevance of the "build or buy" decision implied by a LRAIC methodology when signalling **efficient investment in infrastructure** as it could lead to costly duplication of infrastructure when applied to ULL.

7.3 The Need for Clear Regulatory Objectives

Regulatory authorities need to make their objectives clear and select a pricing methodology that is consistent with those objectives. For example:

- If the goal to encourage new entry and competition in the provision of the local loop or alternative technologies delivering equivalent services, the regulated price set should be at or above the stand-alone cost (SAC). This is because at this price a small new entrant could set up from scratch and still make a profit — so entry should be expected.

- If the goal is to be neutral between build and buy, and the regulator does not object to infrastructure competition (e.g. the environmental externalities are not considered undesirable), the regulated price set should be the long-run average incremental cost. However, even in this case, the regulator should recognise that a LRAIC methodology may not be able to uniquely identify a price that provides the appropriate "build or buy" signal.

- If the goal is to promote service quality and competition in service providers using (as opposed to providing) the local loop, the regulator should use a pricing rule that minimises the ULL charges to the maximum extent consistent with allowing the incumbent to recover costs and upgrade the network.

These findings are summarised in the table below.

Table 7.1: Regulator objectives and price-setting rules

Objective	Ideal Regulator Pricing Approach	Comment
Neutrality between build and buy	LRAIC	Should result in efficient infrastructure competition
Practically encourage competition in infrastructure	SAC Plus	May lead to duplication of networks
Low price to ULL users; service quality	Renewals Accounting Pricing	Will require regulator to approve provision for spending on maintenance and renewals
Allocative efficiency	"Short-run" marginal cost	Will only be efficient if there is spare capacity in network.

However, regardless of the way that the two objectives regarding maximum benefit to users and efficient investment are met, it is important that the agreed methodology does not distort competition. This objective, in many respects, is at least unambiguous although often difficult to interpret.

The goal of regulators, therefore, should be to select and implement a pricing methodology that is consistent with other policy objectives discussed above, without infringing the requirement not to distort competition, i.e. achieving prices which avoid price squeezes and other barriers to entry.

The next section examines ways of ensuring that NRAs ensure that the wholesale prices of ULL avoid the potential for a price squeeze. As part of this the options for ensuring non-discrimination will be explored.

7.4 Avoiding Price Squeeze and Ensuring Non-discrimination

If the policy objective was simply to avoid a price squeeze, NRAs could use a retail-minus methodology to set prices. The joint ERG consultation paper on remedies states on page 84 that:

> "Under a retail-minus access price, the incentives of the dominant undertaking to discriminate against retail competitors may be reduced, as rents can be extracted by setting an excessive wholesale price in some cases. A retail-minus access price usually also prevents the dominant undertaking from exposing its competitors to a margin squeeze, as it links wholesale and retail prices such that an independent retail undertaking as efficient as the incumbent is able to compete. As long as the threat of backward integration exists, or if the SMP undertaking cannot extract all rents, incentives to foreclose the retail market by means of non-price discrimination remain."

In the UK, Oftel believes that retail minus (or wholesale minus) pricing is in line with the non-discrimination principle and will avoid the issue of margin squeezes. The regulator states that such pricing is intended to prevent BT from leveraging its market power in the provision of the interconnection services into downstream markets. The focus of regulation would be on the prevention of a margin squeeze by the operator with upstream market power. This applies, especially in three sets of circumstance.

a) *Where wholesale and retail markets are not yet competitive but competition is in prospect*. The regulator states that in these circumstances, cost-based regulation of charges might be a disproportionate response to the degree of market power being exercised, and could even undermine the move towards competition.

b) *When risky investments are undertaken to provide the service*. The reasoning here is that the Director does not automatically place LRAIC+ charge controls on new services because he does not want to impair incentives to innovate. Therefore, while the retail-minus approach may not drive down interconnection charges as far as an approach based on LRAIC+, the incentives and reward provided for current and future investment will lead to greater benefits for consumers in the longer term.

c) *When the market is in a relatively early stage in its development and a significant degree of uncertainty exists as to future market developments.* The reasoning here is that LRAIC+ regulation affects market development, and by setting a low charge to compete against might slow or even prevent the development of effective competition. A retail minus rule would avoid this possibility while ensuring that the efficient downstream competitors can compete with the firm with upstream market power.

In the absence of a retail-minus methodology, the existence or possibility of a price squeeze does not rest solely on the wholesale costs (which are the focus of this study). A price squeezes can be identified by considering the following:

- The retail price of the service (see below);
- The cost of the wholesale product purchased by new entrants from the incumbent; and
- The additional costs, including, but not limited to the retail costs, incurred by other operators to provide the relevant services.

The wholesale and other costs could be astronomically high (or ridiculously low), yet if the retail price exceeds the corresponding costs by a reasonable amount, then a price squeeze cannot take place.

7.4.1 Avoiding a price squeeze

The first step in assessing whether a price squeeze is taking place is to review the relationship between the three elements discussed above (i.e. retail price, wholesale costs and other costs). However, this is not always easy. Squire Sanders recognised the difficultly of identifying the relevant retail price for the purposes of ULL price squeezes stating that:[33]

> "Identification of the correspondent retail service is difficult in the context of unbundled local loops (e.g. incumbents will no doubt argue that services such as ADSL, and not voice services, should be considered; new entrants will invariably argue for a broader

[33] "Legal Study on Part II of the Local Loop Sectoral Inquiry" Squire Sanders, February 2002.

range of services). In an *ex post* price squeeze action, however, it is possible to identify the particular retail services sought to be provided. By way of contrast, in an *ex ante* environment, NRAs cannot identify (with greater specificity) individual retail services. Accordingly, they appear to have three alternative options:

- assess a price squeeze for all possible retail services (starting with the cheapest retail service, given that this service is the most likely to create a price squeeze);
- assess a price squeeze for a sample of the retail services most commonly provided by (or most commonly identified in the business plans of) new entrants;
- create a "weighted average" or "retail basket" of retail prices (as proposed by the Commission in its June 2001 discussion paper for the ONP Committee)."

It is often agreed that the relevant comparison, in terms of an ex-post test, is to look at the wholesale charge and the PSTN line rental. This, however, may not always be a valid comparison. It is worth recalling that the whole purpose of local-loop unbundling — as stated at the Lisbon Summit of 2000 and adopted at the Sevilla European Council — was to bring about a substantial reduction in the costs of using the Internet and to speed up the development of European broadband networks. Given that, the relevant comparison in terms of identifying a price squeeze should be the ULL charge with the retail price of data services, not with the retail price of line rental. However, where unbundlers use unbundled lines to provide a portfolio of services, including voice telephony, the averaged approach could be considered, although the PSTN line rental is not usually calculated in a way that is consistent with the ULL charge. This, in turn, may make it difficult for unbundlers to offer voice telephony using ULL in a way that can compete effectively with incumbents

In terms of the options for the ex-ante test, the third option was used by the Commission in its recent review of allegations of price squeezing by Deutsche Telecom regarding the pricing of ULL and retail services. Commission Decision of 21 May 2003 deals with the complaints lodged by a number of operators operating in the access retail market in Germany and renting the local loop from Deutsche Telecom. [34] The main contention in there complaints is that the margin between the prices DT charges its competitors for unbundled access to local loops in Germany and the prices it charges end-users for access to its fixed network is not sufficient to enable its competitors to compete with it to provide end-user access over local networks.

With this in mind, DG Comp analysed wholesale tariffs and compared them with an average retail tariff (a weighted average over the different products offered to the end customer through the local loop) and concluded that:

> "DT is abusing its dominant position on the relevant markets for direct access to its fixed telephone network. Such abuse consists in charging unfair prices for wholesale access services to competitors and retail access services in the local network, and is thus caught by Article 82(a) of the EC Treaty. In the period from the beginning of 1998 to the end of

[34] Case COMP/C-1/37.451, 37.578, 37.579 – Deutsche Telecom AG, notified under document C(2003) 1536.

> 2001, DT was in a position to end the margin squeeze entirely by adjusting its retail charges. Since the beginning of 2002, DT could in any event have reduced the margin squeeze, by increasing the ADSL retail access charges not subject to the price cap system."[35]

The Commission concluded that DT's abusive pricing strategy seriously impeded competitors on the market for access to the local network in Germany. However, the Commission also identifies the following mitigating circumstances:

- The weighted average methodology, through which the retail tariffs of different products are bundled together to be compared with the wholesale charges, is relatively new.
- For the period since 1 January 2002, DT's only legal means of reducing the margin squeeze has been limited to increases in the T-DSL charges, due to the imposition of price cap restrictions.

Some of the interesting lessons from the price squeezing case in Germany are summarised in the Box below.

[35] Paragraph (199) of the above mentioned Commission Decision.

Box: Issues arising from the German price squeeze case

- The imposition of a regulated wholesale charge and a price cap on the retail tariffs should be operated with extreme caution. The fine was mitigated because at least for 2002, DT retail charges were effectively constrained and the wholesale charge determined by the NRA.
- DG Comp is asking DT to put an end to this situation. This resulted in an increase in retail tariffs.
- RegTP, in Section 5.4 of the above mentioned Decision Notice, acknowledges the possibility of a price squeeze when comparing the regulated wholesale charge, fixed at €11.80, and the PSTN line rental, at €11.82, and noting that the latter includes, on top of the retail costs, additional costs related to network components, such as the line card. However, RegTP does not take any action in this respect because of the following three reasons.
- First, it acknowledged the limited freedom of DT to set retail prices, due to the presence of a price cap mechanism. Second, it considers as acceptable the possibility of offering to the end-users some services within the regulated basket below costs, as long as the competition is not potentially hindered by the overall level of the retail tariff of all the services included in the basket. Third, it seemed to give priority to the setting of cost-orientated wholesale charges than to the capacity of potential competitors to compete at the retail level.

7.4.2 Ensuring non-discrimination

An effective application of the non-discrimination principle can help to identify price squeezes. Non-discrimination, however, needs to be defined to capture the following two concepts.

- First, that the local loop provider charges new entrants the same wholesale costs for ULL as they charge to their own retail arm for DSL retail products.
- Second, that the costs incurred in providing (and selling) ULLs are calculated in the same way for other closely related products (such as PSTN line rental).

The first of these merely re-states the non-discrimination principle for ULL products. This is important, in that the ULL charge incurred by the incumbent when providing its own ADSL products cannot be reduced when it lowers the retail price of its ADSL products, without a corresponding reduction in the ULL charge to other operators except if it can show cost savings in the broadband network elements (eg DSLAM and / or ATM nodes).

The second, however, goes further and suggests that the charges for PSTN line rental estimated by the local-loop provider and charged to their own retail arm and to other operators, where appropriate, are consistently estimated.

Oftel in the UK has recognised the need for consistency between different services using the local loop and have requested that BT introduce a new product called wholesale line rental. This will allow alternative suppliers to rent access lines on wholesale terms from BT, and resell the access lines to the end-user, enabling the alternative supplier to provide a single bill that covers both line rental and telephone calls. In "Protecting consumers by promoting competition - Consultation on Oftel's review of the fixed telephony market, 31 January 2002" Oftel stated that:

> "… if introduced, the price of wholesale line rental should be consistent with the price for unbundled local loops. The price for unbundled local loops is based on long-run incremental costs and includes a mark-up for common costs. A major difference in the prices of the two products would be that wholesale line rental would not include charges for services specific to unbundling the local loop. The charge for ULL, however, does not include costs of components that are provided by the operator buying the 'loop' or which were charged for separately, notably the costs of the line card and of exchange accommodation. As with ULL, the charge for wholesale line rental will exclude the costs of retail activities that BT does not incur when providing the wholesale product."

Such an approach, however, may expose asymmetries between the price of line rentals in Member States and their cost. Oftel (2002) proposed to deal with this issue as follows:

> "Oftel proposes that this service should be provided subject to a requirement that BT does not discriminate unduly in favour of its own retail customers. BT would therefore be subject to similar requirements in terms of accounting provisions as it is for Standard Services. This does not mean that BT will be forced to raise the retail line rental above the wholesale rental charge, since the availability of this product means that other operators would have the same ability as BT to finance losses on access from profits on calls given the availability of interconnection services from BT or its competitors at cost-based rates."

In other words, the costs incurred in providing access should be treated consistently whether they are used to provide line rental to voice customers or ULL products for broadband services. These costs should then be charged to all operators in a non-discriminatory manner. But this may lead to ULL costs (and DSL prices) that are "high" as they may be cost oriented, and to PSTN line rentals that are "low" (even though the costs are high) due to political reasons, price caps or other factors.

The two main points, therefore, are that:

- ULL costs should not be compared with the price of line rental to examine whether a price squeeze exists or not. This may, however, provide a useful first indication of the relationship between costs and prices in a Member State.

- The cost of network elements used to provide line rental should be calculated in a way that is consistent with the ULL charge and it should be subject to an "internal transfer price" between the local loop provider and the provider or retail line rental. If this is the case — and if the price of the line rental is related to its cost — then it could provide more insight into a price squeeze investigation concerning ULL products (although a number of network elements will differ).

8 IDENTIFYING BEST PRACTICE

8.1 Introduction

This section presents a number of illustrations of "best practice" that may help NRAs refine their pricing methodologies for ULL.

It is worth noting that the best practice examples in this section are intended to be indicative rather than exhaustive, as not all NRAs responded fully to the Commission's questionnaire and the state of play in all Member States is evolving rapidly. Nevertheless, they should provide some guidance to NRAs on issues that could improve the way that prices for ULL are set and point to examples from Member States where such best practice is already in place.

8.2 The Importance of Transparency

8.2.1 Transparency of pricing methodology

Although the study has raised a number of questions about the appropriateness of a LRAIC methodology to set prices for ULL, it notes that this methodology has become the dominant paradigm for ULL pricing.

The review of experience in Member States presented in the Annex has shown that a number of Member States (including **Greece**, **Sweden** and **the UK**) have discussed the broad objectives behind a LRAIC methodology to set ULL prices. However, few, if any, NRAs have examined whether a LRAIC methodology is appropriate for an access (rather than a core) network and specifically whether it is capable of meeting the Commission's objectives for ULL. As discussed in Chapter 6, a LRAIC methodology for access may lead to a higher price than the use of some other methodologies, and it is not clear how such a result can be reconciled with the policy objective of maximising benefits to end users or lowering the costs of using the Internet.

Similarly, given that prices for ULL are geographically de-averaged and relate to the costs of a copper-based network that is unlikely to be replicated in its current form by any new entrant, it is not clear whether the build or buy signals inherent in a LRAIC methodology will necessarily lead to efficient investment.

Moreover, a LRAIC methodology may not always be consistent with the Commission's objective of avoiding price squeezes, although this will of course depend on the level of the retail price. In **Belgium**, the IBPT has set the charge for full ULL on an approach similar to retail minus in order to attempt to avoid a price-squeeze situation.

Best practice lesson 1:

It is good practice to explicitly link policy objectives, and the trade-off often associated with them, to the preferred pricing methodology. In particular, regulatory authorities should show how the methodology that they propose to use to set ULL charges achieves the Commission's objectives of maximum benefit to end users, efficient investment in infrastructure, and how it avoids price squeezes.

8.2.2 Transparency of connection charges

Chapter 2 of this report showed that there was a great deal of variation in the connection charge, although chapter 3 suggested this was less of an issue than the variation in the rental charge as the latter was on-going while the connection charge was one-off.

It is, however, important that the costs actually covered by the connection charge are transparent in order to review whether some costs are being recovered inappropriately. **Italy** can be identified as one example of best practice in this regard as Agcom has itemised the types of costs recovered through the connection charge and provided its assessment of whether the estimates proposed by Telecom Italia on the time taken to undertake each activity associated with connecting ULL products or customers (and hence their costs) are reasonable.

Best practice lesson 2:

The cost categories included in the one-off or connection costs associated with each type of ULL product should be made transparent with the SMP operator providing an estimate of the time required to undertake each of the tasks (and equipment costs) required to connect a ULL product or customer.

8.2.3 The level of detail

The complexity of the ULL product to be offered by the SMP operator in each country requires a detailed Reference Offer, especially when it comes to co-location agreements, where there is scope for a multitude of different specific charges.

Reference offers for ULL products should be complete and sufficiently detailed. In this respect, the **Spanish** NRA is an example of best practice, as it requires Telefonica's ULL Reference Offer (OBA) to provide an adequate level of detail.

Best practice lesson 3:

The Reference Offer for ULL products should be provided in such detail that the new entrant would be able to fully quantify the entire wholesale costs (including all fees connected to co-location services) incurred to provide the service to the end customers.

8.2.4 Transparency on non-price issues

A related issue is the need for transparency on non-price issues such as quality of service. Service Level Agreements (SLA) are often designed with the aim of guaranteeing a given level of quality of the offered service. This is foreseen by article 10 of the Regulation (EC) No 2887/2000 and point D.2 of its Annex.

Quality of service is defined mainly with reference to the timeframe necessary to undertake the following two activities: opening the loops to the requesting operators and the repair times.

Some Member States, such as **Belgium, Italy, Ireland** and **Spain**, have identified the need to include SLAs to ensure that non-discriminatory would capture quality of service aspects. In this

respect, it is important not only to identify and offer different options, but also to put in place penalties and compensations that would make the implementation of the agreements binding.

Best practice lesson 4:

Non-price factors such as quality of service should not be ignored when reviewing whether an incumbent operator is acting anti-competitively and, therefore, whether the Commission's objectives are being met.

Service-level agreements that include penalties and compensation arrangements are important to ensure that all operators are treated in similar ways.

8.3 Best Practice LRAIC Methodologies

Given that LRAIC is by far the most common pricing methodology and that estimating the costs of rebuilding an access network in today's prices (which will usually be higher than the historic costs of the network) may produce higher prices for ULL, it is worth considering ways by which this methodology could be implemented so as to help meet the Commission's objectives.

The examples have been categorised as follows:

- improvements to the methodology used to calculate costs;
- improvements to the process;
- strengthening the economic signals in the ULL price; and
- migrating to a LRAIC-based prices.

8.3.1 Improvements to the Methodology Used to Calculate Costs

The study has identified improvements that could be made to a LRAIC methodology when estimating both capital and operating costs.

8.3.1.1 Capital costs

To recap, the "long run" in the definition of LRAIC and LRAIC is the time horizon within which the firm can undertake capital investments or dis-investments to increase or decrease the capacity of its existing productive assets. Using a long-run measure of cost, such as LRAIC, all inputs, including capital equipment, can vary in response to a change in demand.

The measure used to value assets when building LRAIC models is current costs or market value of the asset, normally determined as the lower between its recoverable amount (being the higher of realisable value and value in use) and its replacement cost.

Yet the way that current costs have been determined by local-loop providers in some Member States appears unlikely to produce a charge that would be consistent with a LRAIC charge. BT, for example, in its Accounting Documents (September 2003) discusses the techniques used to revalue assets where there is no technical change. These are indexation (for relatively new

assets) and absolute valuation (for older assets). In situations where there is technical change, existing assets would not be replaced in identical form. Instead, the replacement cost would be based on the cost of a modern asset with similar service potential.

Such an approach suggests that assets in the access network — which may well appear to exhibit very little technical change — would simply be taken almost on a one-for-one basis and simply re-valued from historic costs to current costs. This, however, is unlikely to produce the costs that would be incurred if the market were competitive. (Indeed, as far back as 1923, Justice Brandeis in the US as reported in Kahn (1988) argued that reproduction (current) costs to which prices in purely competitive markets tend to correspond are not the current costs of reproducing the existing plant, brick by brick, but the current cost of producing the service with the most modern technology available. More recently, the Commission's Recommendation on Unbundled Local Loops (April 2000), defined current costs as the costs of building an efficient modern equivalent infrastructure and providing such a service today.)

In other words, a current cost methodology should be about more than simply revaluing all existing assets that are currently in the incumbent's fixed asset register recorded at their historic costs. Such an approach may well simply lock in inefficient, unnecessary, and outdated design rules and blunt the incentive to improve performance, particularly when costs are rising.

When most assets are simply re-valued because technical change is less widespread, it is not clear that "current costs" will equate with the "forward-looking costs" required under a true LRAIC methodology. For core networks, where technical change is more prevalent, more MEA assumptions will be needed and these will push the operator's costs towards costs that appear more "forward-looking". For access networks, however, the major assets, such as cables, trenches, line cards, distribution points etc, are less subject to technical change and the typical approach to CCA valuation used by operators will simply mean that these assets are re-valued on a "brick-by-brick" basis. This is not consistent with a LRAIC methodology and cannot possibly mimic a competitive outcome. A true LRAIC methodology would consider efficient levels of investment in all aspects of network investment (such as efficient laying of trench and cables and distribution points that are efficient utilised).

The **Danish** experience avoided this problem by using a bottom-up model as one of the inputs (indeed, the main input), when setting the ULL charge. This approach allowed for an optimal access network to be designed, free from the constraints of the incumbent's actual network. But importantly (and discussed further below), the bottom-up model was reconciled with a top-down model developed by the incumbent in order to confirm that the network modelled was considered reasonable and reliable. Agcom in **Italy** has also in the past looked at the existing Telecom Italia network and incorporated some adjustments which it considered to be appropriate (such as changing the levels of spare capacity in the network).

***Best practice lesson 5**:*

When assets are re-valued to current costs, the objective should be to calculate the current cost of producing the service with the most efficient technology available or the most appropriate design rules and assets given existing (and expected future) demand rather than the current costs of reproducing the existing plant using all of their existing assets and design rules.

The indexation and absolute valuation methodologies as a current cost methodology can only be accepted if there is absolute confidence in believing that current technology, structure, amount of equipment and configuration are the most efficient solution.

Another important issue when estimating capital costs is to use an appropriate depreciation methodology. As discussed in Chapter 4, the preferred method for calculating depreciation is to use economic depreciation. However, economic depreciation is in practice difficult to calculate, as it is information intensive.

Because of the practical difficulties with calculating economic depreciation simpler approaches are often preferred. However, the yardstick by which these simpler approaches should be judged is how close they are likely to come, given the nature of the asset concerned, to the theoretically correct measure of depreciation. For many assets in the access network, such as duct and trench which exhibit rising pricing and generally constant output, a tilted-annuity approach (which takes account of price changes) might best approximate economic depreciation. However, this analysis should be done for each major asset category and may differ from Member State to Member State depending on the assets.

An example of best practice on this issue is ComReg in **Ireland** where a Working Group agreed that tilted annuities should be used to depreciate assets in the access network. In **Denmark**, the incumbent, TDC, conducted its own analysis of economic depreciation and chose the methodology that best approximated this in its top-down model, showing that estimates of economic depreciation can be developed.

Best practice lesson 6:

The depreciation method used in each Member State should be economic depreciation or the method that best approximates economic depreciation. For the most important assets in the access network, tilted annuity is likely to be the methodology that best approximates economic depreciation.

8.3.1.2 Operating costs

The estimates of operating costs used in price determination should be based on the costs of operating in an efficient manner an efficient network using modern equivalent assets. It would clearly be inconsistent to combine cost estimates for assets based on the LRAIC principles explained above with estimates of the operating costs needed to run the existing incumbent network.

ComReg in **Ireland** has explored a number of options for identifying operating costs that are consistent with those capital costs that would be incurred by an efficient new entrant building a new local loop network. Such an approach — although difficult to implement — is best practice and in marked contrast to the approach taken by many other regulatory authorities to use actual operating costs, even when these are considered to be efficient. (Even efficiently incurred operating costs in the current network are not necessarily consistent with the capital base in a properly defined LRAIC model.)[36]

Best practice lesson 7:

The operating costs required when using LRAIC methodologies are those associated with those assets that would be installed by an efficient new entrant.

An adjustment to the operating costs of the incumbent operator is adequate as a proxy to this new hypothetical set of costs only in so far as the incumbent's assets can be assumed to correspond to those of an efficient hypothetical new entrant and if the local loop provider is assumed to be efficient in running its network.

8.3.2 Improvements to the Process

8.3.2.1 Working groups

Setting wholesale charges through forward-looking LRAIC is a complicated task. Most of the information that is necessary to understand the structure and the current cost of the access network in the country in question is with the incumbent. The incumbent claims that most of this information is confidential and other operators might not always be able to contribute even in providing relevant cost information.

The involvement of all parties is quite important in ensuring that the information provided by the incumbent (be it used for either a bottom up or a top down model) is carefully scrutinised. The role of the regulator in addressing the concerns of all the parties is crucial.

Setting up working groups that mediate the different views of the different parties might help in this respect. If well managed, working groups help focus resources, during the development of the models, on the most contentious issues (avoiding more serious problems at a later stage). They can add transparency and generally improve the reliability of the results.

We are aware of at least two different countries that have used working groups to address general and more specific issues, namely **Portugal** and **Ireland**.

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[36] A new access network, for example, would be expected to contain much more pressurised cable than existing networks. Pressurised cable, by offering better protection against damage from rain, leads to fewer faults. It would, therefore, be inconsistent to model a new, efficient network yet to use the operating costs actually incurred by a local-loop provider.

Best practice lesson 8:

Working groups comprising SMP operators and other operators, organised by regulatory authorities can improve the reliability of the results, helping focus the resources on the most contentious issues and adding transparency to the process.

8.3.2.2 Reconciliation of models

ULL charges proposed by the local-loop provider, even when consistent with cost orientation, are likely to be inflated. This is because they will include inefficiently incurred costs and legacy design rules that may not always be appropriate to the existing network. They are also likely to reflect the costs of operating the actual network rather than those of operating a new and efficient network (as required by LRAIC).

The best practice here would be **Denmark**, **Sweden** and **Austria**.[37] The case study presented in Chapter 3 showed that the reconciliation of a bottom-up and top-down model in Denmark revealed and quantified the enormous differences produced by the two approaches. In Austria, the initial results produced by the bottom-up model were only 56 per cent of the costs estimated by the top-down model and consequently some parameters of both models were adjusted to reconcile the differences.

Best practice lesson 9:

Building bottom-up models, which are then reconciled with top-down models, or at least exposing top-down models to greater scrutiny, can help remove unnecessary or inefficiently incurred costs and reduce the price of ULLs.

By the same token, relying uniquely on bottom-up models that produce ULL charges on the basis of a network structure that has not been reconciled with the real network may also be imprudent.

However, even where a reconciliation of two models is not possible or not considered necessary, NRAs should carefully scrutinise the charges submitted by the incumbent. An example of best practice here would be **Spain** where CMT estimated the cost of some aspects of the incumbent's offer, such as setting up and renting co-llocation space as part of their review of co-location charges.

Best practice lesson 10:

In the absence of a bottom-up model and/or of a reconciliation between a top-down model and a bottom-up model, NRAs should review charges proposed by incumbent's by applying bottom-up principles (such as estimating how much effort is required for connection and what costs would be incurred to provide particular services).

[37] France has also acknowledged the merits of combining top down and bottom up models Decision no. 00-1171 of the Autorité de Régulation des Télécommunications, 31 October 2000 in application of article D. 99-24 of the Post and Telecommunications Code.

8.3.3 Strengthening the Economic Signals in the ULL Price

8.3.3.1 Geographic de-averaging

Unbundled local loops could be priced in at least two ways. One way is by setting a single national price that averages the costs across the Member State as a whole. Another way is to set ULL prices that differ according to cost differences in different regions or geo-types (somehow defined). The experience in most Member States is to set a geographically averaged price that ignores differences between regions. It is worth noting that this issue did not arise in interconnection for core networks, as geography was largely irrelevant; a telephone call could traverse a number of different geo-types. In access networks, however, differences in regions or geo-types are significant and could be identified.

A geographically averaged price, however, does have the potential to distort the "make or buy" signals of new entrants and to lead to inefficient entry by operators. This is because a geographically averaged price will be set above costs in low cost urban areas and well below costs in the relatively higher cost rural areas. This will have the effect of encouraging entry even where it is inefficient in urban areas (as the new entrants may come in if they can undercut the incumbent, even though they have a higher cost base), while discouraging infrastructure investment in rural areas (where they can effectively purchase ULL below their cost). We note also that ART in **France** has taken a slightly different approach by adjusting the averaged price to reflect the fact that ULL is demanded mainly in lower cost areas. France has also recently added an additional dimension to its charging by linking costs to the capacity of the MDF allowing operators in more densely populated areas to offer lower ULL charges.

Finland is potentially an example of best practice on this issue but largely because of the way the market is structured rather than by design. The presence of a large number of operators means that the costs refer to specific demographic circumstances. Oftel in the **UK** has stated that the starting charges for ULL should be geographically averaged, but BT may request geographically de-averaged prices if this can be shown to be justified by differences in the underlying costs. In **France**, the NRA estimates a geographically averaged cost which is then adjusted to reflect the fact that urban areas are generally cheaper to serve.

Best practice lesson 11:

If regulators want to send the appropriate economic signals to entrants and to encourage efficient investment in infrastructure, then the ULL price should be geographically de-averaged (i.e. different charges for different geo-types).

A fuller discussion about this issue is needed in EU Member States and the relationship between ULL charges and line rental needs to be addressed more thoroughly. The argument is often made that social and political efforts have to be considered as well as the objective of sending the

correct economic signals to operators.[38] However, if the social and political considerations that apply for retail voice telephony are to be extended to ULL charges, then regulatory authorities need to accept that any "build or buy" signals inherent in the LRAIC methodology will be (further) blunted. In such a case, it may be worth re-examining the alternatives to LRAIC discussed in earlier sections of this report.

8.3.3.2 Price Setting Timeframe

In order to take major decisions on investments in infrastructure equipment with an asset life spanning for a number of years, operators would need information on the level and evolution of the ULL charges in the foreseeable future.

In a fast-changing world characterised by continuous technological innovation, it could be dangerous, however, to embark in regulatory decisions that lock wholesale charges for a substantial period of time. On the other hand, setting ULL charges for too short a period does not necessarily favour (productive) efficiency as potential investors, faced by wholesale charges that are likely to change on a yearly basis, may tend to wait and see.

In December 2000, the NRA in **Spain** has set ULL tariffs for a period lasting three years, thus contributing to greater levels of certainty for all in the market.

Best practice lesson 12:

If regulators want to send economic signals to new entrants that are more likely to be effective in the medium/long run, then they should set ULL charges in advance for a reasonably long period.

8.3.4 Migrating to a LRAIC based price

Section 4 showed that a LRAIC methodology is likely to lead to a higher price for ULL largely because of the need to revalue assets on a current-cost basis. However, when current costs exceed historic costs, the efficient outcome may not be to revalue all of the assets in one go (as is the case under a LRIC methodology). Kahn (1988) argues that:

> "This consideration constitutes the strongest economic argument for the use of reproduction [replacement] instead of original cost as the basis for computing capital charges. As proponents of that method of valuation point out, prices in competitive markets will tend to be set at the level that covers current, not past, capital costs. This is a statement of long-run tendency only, to be sure; in periods of rising reproduction costs, it will be achieved only as demand presses to the limits of existing capacity and new investments need to be attracted or old capacity replaced. Still it represents the competitive ideal, and departures from it in periods of long-run inflation or deflation involve inefficiencies, to the extent that there is any elasticity in demand."

[38] See, for example, Groebel and Schnepfleitner (2000) "Geographically averaged rates in the context of Local Loop Unbundling — The Austrian and German European regulatory rationale" prepared for the 11th European Regional Conference on September 9-11, 2000 in Lausanne, Switzerland.

Kahn, therefore, argues that when current costs are rising, as they would be if valuing access networks, it may not be appropriate to simply revalue all existing assets to current costs. Instead, this could be done gradually as assets need to be replaced, at which point the price would need to reflect the new investments in order to allow firms to recover their investments.

The **Netherlands** and **Denmark** may be an early example of best practice when it comes to managing the transition from historic costs to current costs. There, a gradual increase to the charges implied by current costs was allowed over five (for Netherlands) or more (for Denmark) years.[39] Such a phased approach has also been recommended by the Commission when it suggested that NRAs could specify a "reasonable time period necessary for the gradual adjustment to current costs of the price of local loops".

Best practice lesson 13:

Regulatory authorities should try to avoid sudden price spikes caused by moving from prices based on benchmarks or historic costs to prices set using a LRAIC methodology.

This might reduce the economic signal of the LRAIC charge, but it would be more consistent with a cost-recovery approach and benefit end-users with lower interim charges.

[39] It is stated in the Danish legislation that the transition period as a starting point should five years but it could be longer. At the moment, the transition period in Denmark is set to seven years by the Danish NRA. The length of the transition period depends on the possibility to obtain access to the homes via other technologies.

APPENDIX 1: MEMBER STATES REVIEWS

A1.1 Introduction

This appendix summarises the information on ULL charges gathered for each EU Member State (MS).

The relevant sources for this appendix have been the answers to the Co-Com questionnaire COCOM 03 – 05 on local loop unbundling pricing methodologies and any additional information that was publicly available on the NRA's websites.

Each review has been organised under the following headings:

- Background. This section includes general comments and relevant background to the process of local loop unbundling. It includes material on the success of ULL and bistream access in the each of the national markets, drawing heavily on the 8th and 9th Reports on the Implementation of the Telecommunications Regulatory Package.

- Basis for setting ULL charges. This section includes information on the cost base used (historic or current costs), the cost standard (LRAIC or other methodologies) and the methodology and inputs used to estimate the pre-tax cost of capital for ULL charges.

- Clarity of regulatory objectives. This section illustrates whether regulatory authorities have made their objectives clear when pricing the local loop.

- Scope of pricing methodology. This section highlights possible differences in the methodology between the different products, i.e. full ULL, shared access and co-location.

- Transparency of inputs. This section indicates whether the inputs used in implementing the methodologies are transparent.

- Price squeeze/non-discrimination. This section discusses the implementation of measures aimed at avoiding price squeezes and catering effectively for non-discrimination.

- A considerable amount of effort has been exercised to obtain as much information as possible for each MS. Nevertheless, for some MSs, information has not been available, so some headings do not appear for some MSs (and there is no section on Luxembourg).

A1.2 Austria

A1.2.1 Background

Austria started the regulatory process of unbundling the local loop early. The Telecommunications Act 1997 allowed for ULL from the very beginning of liberalisation.

Telekom Austria AG, the SMP operator, is obliged to offer access to its unbundled local loop under non-discriminatory and cost-oriented terms. The regulatory authority has to make a decision on a case-by-case basis as to whether a specific network element is to be offered on an unbundled basis taking into account the development of competition in the local area.

Entrants can request co-location at all local exchanges. The ruling however does not allow for "open co-location" inside the incumbent premises, if incumbent's equipment is concerned. Telekom Austria is required to agree with an alternative solution if physical co-location is not possible for technical reasons.

For determining the costs of the local loop an analytical bottom-up model was used which had been developed in co-operation with Wissenschaftliches Institut für Kommunikationsdienste (WIK) [Scientific Institute of Communications services]. The WIK model, an advanced version of the model commissioned by the German regulatory authority for Telecommunications and Post (RegTP) and already used for the German decision of February 8, 1999, is based on a further development of the American LECOM model. It relies on a scorched node approach, i.e. it does not re-model the geographical location of the MDF sites but operates within the local loop boundaries. In this approach an efficiently structured, abstract state-of-the-art access network is set up which aims at efficiently satisfying the existing number of subscribers. The cost model takes the number of subscribers as an extraneous factor which is equated with the existing subscriber volume taking into account the geographical distribution. The network created is assessed at current cost.

The bottom-up model calculates the cost on the basis of the Forward Looking Long Run Average Incremental Cost approach (FL-LRAIC). This approach aims at simulating market prices in a competitive situation not yet existing, by taking into account only the unavoidable costs directly and indirectly attributable to the product - plus an extra charge for common and overhead costs - of an efficient company and network on the basis of current cost. Within the scope of the FL-LRAIC method the bottom-up model only serves for determination of the investments; other cost, mainly operating expenses and cost of capital (WACC) are considered separately.

Uptake of full unbundling has been characterized by high growth rates. It was operational on 5,400 lines by 1 July 2002; only three months later, by 1 October, the number of lines had increased by 35 per cent to 7,300. However, over the same period new entrants requested no shared access lines. Finally, as at July 2003 the total number of fully unbundled lines had risen to 15,640.

A1.2.2 Basis for setting ULL charges

Cost base: current cost.

Cost standard: LRAIC.

Cost of capital: 9.34 per cent.

A1.2.3 Scope of pricing methodology

The price of ULL is based on a current valuation of assets. Prices are averaged geographically, so that ULL charges remain the same throughout the country.

Monthly charges for line sharing are 50 per cent of full unbundling charge. The one-off payment is 200 per cent of the line transfer charge applicable for full unbundling.

Setting up of co-location areas is charged for at cost. The rent charged for co-location space depends on the local rent for business premises; its calculation is based on the "Immobilienpreisspiegel" (Real Estate Index) published by the Federal Guild of Real Estate and Investment Trustees.

A1.3 Belgium

A1.3.1 Background

The Belgian Council of Ministers passed ULL legislation in October 2000. This new law allowed all operators to gain access to the incumbent operator's (Belgacom) local loops from January 2001. Belgacom issued a first reference unbundling offer in December 2000. IBPT/BIPT, the national regulatory authority, stated that the RUO did not comply with the EC unbundling regulation and required amendments to include line sharing and sub-loop unbundling in the coverage of ULL

The regulator did not use a bottom-up approach to estimate the cost of full ULL and shared access. This would have required a detailed cost computation of all relevant network elements, which was not feasible because the accounting systems are not in place. Once the accounting systems are in place, a tariff rebalancing will probably take place; prices (retail and wholesale) are expected to increase.

IBPT used neither LRAIC nor CCA (except for shared pair), and has no plans to use them. IBPT realises that LRAIC or CCA to set charges would increase prices, and that would impede further development of ULL and broadband.

Market data available up to July 2003 indicate that there is not strong ULL uptake despite increasing numbers of ULL lines. As of July 2003, the number of fully unbundled lines was 3,057 and the number of shared lines 2,307. The poor economic situation of the market players was probably the underlying reason behind the slow uptake.

In contrast to ULL, ADSL uptake has been relatively good. The incumbent had 400,000 customers in August 2002.

A1.3.2 Basis for setting ULL charge

Cost base: HCA (raw copper), CCA (shared pair).

Cost standard: retail minus (raw copper), LRAIC (shared pair).

Cost of capital: 12.88 per cent.

A1.3.3 Scope of pricing methodology

All joint and common costs in the access network are allocated to full ULL.

The price of full ULL is determined on a retail-minus basis. IBTP follows a top-down approach. It starts with the average retail price charged to the end customer and adjusts this price:

- eliminating any costs that are not linked to the rental of the raw copper pair; and
- adding maintenance costs linked to the rental of the copper pair for ADSL services.

Shared ULL only charges only include incremental costs such as repair costs, IT-costs, bad debt and billing costs and a network investment incentive cost.

Rental fees for co-location are set as a geographical average of market price.

A1.4 Denmark

A1.4.1 Background

Full local loop unbundling has been available in Denmark by law since 1 July 1998. ULL uptake has been relatively high. Many agreements have been reached between the incumbent and other operators since the implementation of ULL. By July 2003 there were over 51,000 unbundled lines.

An Executive Order on Standard Offers, which came into force in November 2001, requires SMP operators to provide a reference offer for bitstream access. The incumbent has an obligation to offer bitstream to other operators under the same terms as for the sale to its retail arm. The incumbent published its first reference offer on 1 February 2002. Following that, and up to July 2003, 10,396 wholesale bitstream lines were offered.

A1.4.2 Basis for setting ULL charge

Cost base: CCA.

Cost standard: LRAIC.

Cost of capital: 10.85 per cent.

A1.4.3 Clarity of regulatory objectives

The NRA is implementing national law (the Telecommunications Act), which states that the cost standard shall be LRAIC. In particular, in subsection 5 of section 55 of the Telecommunications Act it is stated that:

> "The LRAIC price regulation has a dual purpose:
>
> Firstly, to fix an interconnection price which, in contrast to a price based on historic costs, "simulates" or corresponds to the costs that a new provider would have to pay for establishing his own network, provided that such provider has a certain volume of traffic to support this basic investment. On the one hand, such regulation affords new market players the possibility of using existing networks until they have achieved a volume that makes such access uninteresting, without any need to pay for inefficiency, bad investments etc. on the part of the former monopoly provider. On the other hand, the regulation provides an incentive for them to invest in new alternative networks as soon as their business can bear such costs.
>
> Secondly, the price regulation has the more radical aim of contributing to breaking up the monopoly market by ensuring new market players a reasonable competitive margin when they enter various submarkets, irrespective of whether this may be a burden on the former monopoly provider. Finally, the investments may already be written down and paid for."

Therefore, the application of LRAIC in Denmark had as its objective to send the correct buy or built signals.

A higher price was expected than under the historic-cost regime, so a "step-ladder approach" was taken through a hybrid model in between top-down and bottom-up models.

A1.4.4 Scope of pricing methodology

Monthly charges for line sharing are 50 per cent of full unbundling charge. Double recovery of access line costs for a line used for both PSTN and ADSL has been avoided by reducing the cost pool attributed to PSTN usage by the same amount that is being recovered through shared access.

A1.4.5 Transparency of inputs

The model uses efficient costs. A combination of econometric and data envelopment analysis (DEA) was used to try to identify the incumbent's efficient level of operating expenditure. In December 2002, the NRA made the first LRAIC decision, which the incumbent (TDC) decided to dispute. The efficient level of operating costs to be included in the LRAIC model is one of several issues that are being dealt with in this dispute. The Telecommunications Complaints Board is currently reviewing the case and is expected to make a decision shortly.

The inputs used in the methodologies are clear and transparent. The bottom-up model, produced by the non-incumbent operators and revised by the regulator, has been made public in MS Excel, with only business confidential input data not disclosed. The regulator revised the bottom-up model when reconciling the top-down (developed by the incumbent) and bottom-up models. This resulted in the present hybrid model.

The model development has been transparent as well, with the affected parties taking part in the process.

The cost of capital has been valued by the WACC method; with equity capital valued using a Capital Asset Pricing Model (CAPM). The NRA "reconciled" the estimates for the cost of capital produced by the incumbent and by new entrants.

A1.5 Finland

A1.5.1 Background

Full ULL was mandated in July 1997.

SMPs set their own charges, using their own methodology. However, the regulator is called to settle disputes between the access seeker and the SMP operator that might arise.

By July 2003 there were around 61,000 fully unbundled loops in Finland and 21,500 loops in shared use. These figures imply a 74 and 187 per cent increase respectively since October 2002.

Bitstream access is available in Finland. In 2002 there were about 2,000 ADSL lines operated by new entrants under bitstream offers, a 100 per cent annual increase. By July 2003 bitstream offers had increased to 9,000.

The 8th implementation report identified three major problems that gave rise to the very poor bitstream uptake until 2002. First, some operators had retail ADSL offers but no wholesale offer to new entrants. Second, in some cases there was a wholesale offer that could be negotiated, but it was not included in the public price list. Finally, there were price-squeeze problems.

A1.5.2 Basis for setting ULL charge

Cost base: varies between the 46 SMP operators who set their own prices.

Cost standard: varies between companies, though the NRA bases its price reviews on LRAIC.

Cost of capital: varies by operator.

A1.5.3 Clarity of regulatory objectives

The regulator does not make any clear statements, other than that prices must reflect costs and can include a reasonable return on capital.

FICORA asked all 41 SMP operators to report on their prices, and selected three of them for a closer review of their prices. During this process, these companies reduced their local-loop prices by between 24 and 37 per cent.

A1.5.4 Transparency of inputs

The costs used to set wholesale charges are the companies' actual costs.

There are general guidelines on how to depreciate capital expenditure.

Cost of capital is derived through a WACC calculation, where equity capital is valued using the CAPM.

A1.5.5 Price squeeze/non-discrimination

On 11 December 2003, the Finnish Competition Authority announced that it will take a number of (so far unnamed) SMP companies to court over high charges to entrants to use their networks to provide broadband services (i.e. shared access).

It was made explicit that the intention of these first challenges was also to act as a signal to the other SMP operators to take competition and non-discrimination issues seriously.[40] The NRA is also preparing changes to the legislation.

[40] 11/12/2003 *Talous Sanomat* http://www.taloussanomat.fi/etusivu/2003121127203601.asp

A1.6 France

A1.6.1 Background

Unbundling regulation entered into force in January 2001.

When setting France Telecom's tariffs for unbundling in 2001, ART (the regulator) used a top-down model to estimate the cost. However, in its decision no. 00-1171 (31 October 2000) ART indicated it intends to combine the top-down and bottom-up approaches to set the tariffs for access to the copper pair in the future. The justification given was that even though a bottom-up model better meets the principle of efficiency in the long term, a top-down model is also needed because it is closer to the real historical experience.

ULL uptake has been slow; while 9 unbundling contracts have been signed, in 2003 (July) only 2,659 lines had been fully unbundled. However, shared access has been a great success with 60,213 extra lines being offered in less than a year – by October 2002 only 61 lines had been offered.

There were 8,000 bitstream access lines in 2002.

A1.6.2 Basis for setting ULL charge

Cost base: current cost.

Cost standard: top-down LRAIC.

Cost of capital: 10.4 per cent.

A1.6.3 Clarity of regulatory objectives

There is no clear statement of why the specific methodology was chosen. There are however specific principles that guide ART (from ART decision notes): cost orientation of tariffs; the principle of efficiency; the principle of non-discrimination;and the principle of fair and long-lasting competition.

A LRAIC-pricing methodology was required by a Decree published on the 12 December 2000, even though ART seemed to favour historical costs, at least in the short run.[41] Because it is able to modify the terms of unbundling, ART has been able to set the rental price at the desired level.

A1.6.4 Scope of pricing methodology

The full access fees for 2001 were obtained using a replacement-cost model produced by France Telecom and adjusting civil engineering costs; subtracting connection costs, which were deemed

[41] Bourreau, Marc (2002) "Local loop unbundling: the French case" ENST Department of Economics.

to have already been recovered from consumers as operating expenditure; and adjusting after sales service costs to reflect the greater complexity of interventions. In 2002 ART wanted additional adjustments to be made so as to reconcile the value of the operational expenditure with that of the audited figures reported for universal-service obligations and to reflect the fact that ULL mostly happens in urban areas, where it is cheaper.

ART estimates a geographically averaged cost, adjusted to reflect the fact that ULL is taking up disproportionately in cheaper-to-serve areas.

The tariff for shared access must cost at least as much as full access less retail subscription. It must also include the cost of the high frequency filter required for the provision of the service.

Co-location charges are set on a site-by-site basis.

A1.6.5 Transparency of inputs

A top-down model approach is used, so actual costs from the books are used. However, it seems that an efficiency adjustment has been operated: "the costs which are taken into account must correspond to those incurred by an efficient operator." The method used is to compare costs and tariffs to "those of other operators providing comparable services".

Operating costs are taken from France Telecom's accounts.

The development of the methodology has been transparent, with interested parties given the opportunity to comment.

A1.6.6 Price squeeze/non-discrimination

"Principle of non-discrimination" is mentioned as one of the ART's guiding principles. This is taken to mean that unit prices applicable for access to the local loop must be equivalent for third-party operators and France Telecom's own departments or subsidiaries. This applies to both full and shared access.

The principle of non-discrimination is also included in France Telecom's specifications (Article 18), which were approved by decree no. 96-1125, where it is stated that:

> "the activities, services and network elements used by France Telecom are valued at their external sale value or, if not possible, with respect to tariffs practiced by France Telecom for users or operators interconnected to its network."

In December 2003, ART issued a decision that took more explicit account of the potential for price squeezing when considering lower IP access charges from France Telecom, and also took more account of geographic differences, although indirectly by setting co-location charges on a per site basis allowing more densely populated areas to benefit by spreading these fixed costs over more customers.

A1.7 Germany

A1.7.1 Background

Germany was one of the earliest countries to take the initiative in unbundling the local loop. ULL was mandated in the Ordinance on Special Network Access on the basis of German Telecommunications Act in 1996. ULL was officially implemented when the telecommunications markets were opened to competition in January 1998. The price Deutsche Telekom sets requires *ex-ante* approval by RegTP.

The Ruling Chamber of the regulator (RegTP) mandated line sharing in March 2001. The conditions established by the Ruling Chamber required Deutsche Telekom to offer line sharing on a non-discriminatory basis, and commercial line sharing began in September 2001.

Deutsche Telekom is also obliged to provide co-location space upon requests from new entrants. Physical co-location is preferred to remote co-location. Virtual co-location is required if physical co-location is not available.

For a full account on the evolution of ULL charges in Germany see the German Case Study in Chapter 4.

By October 2002, 91 agreements on full unbundling had been concluded. These agreements were associated with 855,404 fully unbundled lines provided by Deutsche Telekom; a 56 percent increase since October 2001. This number further increased by July 2003 to reach 1,144,000 – the highest number of fully unbundled lines among EU countries.

The case of Germany though can be considered as exactly the opposite of the French case. In Germany the high success of fully unbundled lines implies that the numbers of shared lines have been kept very close to zero (20 in July 2003).

A1.7.2 Basis for setting ULL charge

Cost base: CCA

Cost standard: LRAIC

Cost of capital: 8 per cent

A1.7.3 Scope of pricing methodology

The price of ULL is based on a forward-looking LRAIC model that considers real interest rate and the depreciation period for the copper cable regardless of the geographical location. The basis for the calculation of the direct investment cost component of the periodical costs (monthly charge) is the incremental investment value (Investitionswert). The investment value is calculated using a bottom-up approach based on replacement values. Using the calculated interest rate and the depreciation period of the individual investment classes, the investment value is annualised

with the annuity formula to incremental capital costs. Operating costs are also accounted for on an incremental basis through surcharges derived from DT's accounts.

Only additional ongoing costs are considered when setting charges for line sharing. These costs include fault-testing costs and equipment costs for the technical realisation of line sharing.

The rental fees for co-location are calculated based on comparison rental fees.

A1.7.4 Price squeeze/non-discrimination

See relevant section in Chapter 6.

A1.8 Greece

A1.8.1 Background

The incumbent (OTE) provided ULL on a case-by-case basis prior to the official mandate in January 2001 by the regulator EETT. In May 2001, EETT approved the incumbent's RUO full unbundled access. EETT held a public consultation on a number of issues pertinent to shared access to the local loop before approving OTE's RUO in December 2001.

There have been cases where the incumbent sought to give preferential treatment to its subsidiaries in the implementation of ULL. In particular, OTE did not provide co-location spaces in its exchanges to rivals until recently, whereas it had been providing them to its ISP subsidiary since 1996.

On 16 March 2001 EETT published Decision 211/3 clearly specifying the costing and pricing principles that should be followed. Costing of full access services is based on LRAIC plus mark up. The mark up covers the common and joint costs of these services. Common and joint costs are attributed using equi-proportionate mark ups. Costing of shared access follows the same principles. The only difference is that there is no mark up for joint and common costs included in the costing of shared access because the common and joint costs of the relevant services are covered by the narrow-band services that the incumbent will continue to offer.

Uptake of unbundled loops is very slow in Greece. The incumbent provides a limited number of lines. In 2002, just over ninety fully unbundled local loops were provided. By 2003 this number increased but the increase has been disappointing (359 lines in total).

The incumbent attributes the slow progress to the lack of demand from other operators. New entrants argue that they are deterred from requesting access by the cost of the service and additional difficulties, such as the absence of a wholesale price for backhaul services; disagreements on who will pay for the cost of co-location; and the absence of number portability.

A1.8.2 Basis for setting ULL charge

Cost base: CCA

Cost standard: LRAIC

Cost of capital: 12.12 per cent

A1.8.3 Clarity of regulatory objectives

The NRA's Decision 211/3 does not state clearly why EETT proposed to use LRAIC or current cost, but EETT does identify the following goals that ULL pricing should realise:

- the promotion of effective, long-run competition;
- economic signals that promote effective investment decision making in the long run;

- non-discrimination against the recipients of the services;
- incentives for the introduction and effective use of new services;
- adequate transparency; and
- cost recovery, including a reasonable return on capital.

A1.8.4 Scope of pricing methodology

EETT has approved OTE's LRAIC methodology, subject to certain improvements regarding shared access to the local loop that OTE must implement (EETT Decision 252/67/29-4-2002).

On January 2003, EETT completed the auditing for the monthly rental, connection fee and related facilities and published the Decision 277/63/28-3-2003 with new ULL prices. These are mostly cost oriented. As a result of the auditing, EETT specified to OTE improvements to be implemented in its costing system. The improvements refer mainly to costs affecting calculation of the monthly rental and connection fees.

EETT's auditor has set OTE's prices for related facilities using a bottom-up procedure.

A1.8.5 Transparency of inputs

Costing principles determined by EETT dictate that the costing methodology should be clear, analytical and verifiable.

The current costs of full and shared access to the local loop are estimated using net replacement costs. Where a similar asset is no longer available in the market, the estimation uses the value of a modern equivalent asset.

EETT has clearly specified what the costs of providing the services of full access to the unbundled local loop and physical and virtual co-location entail (e.g. depreciation of the twisted pair, the twisted pair maintenance costs).

OTE is required to clearly state what asset lives it intends to assume, and is required to use straight-line depreciation.

The cost of capital is estimated using WACC.

A1.8.6 Price squeeze/non-discrimination

EETT's Decision 211/3/16-3-2001 makes special reference to price squeezes and non-discrimination.

The Decision specifies that pricing of local loops should promote fair and sustainable competition, taking into account the need to invest in alternative infrastructure. In particular, the Decision determines that there is no margin squeeze between the wholesale and retail prices of the incumbent's services. Additionally, the Decision specifies that the same service (in terms of

quality and technical characteristics) should be provided at the same price to all operators, irrespective of whether it is offered to a competitor or to a subsidiary.

A1.9 Ireland

A1.9.1 Background

ULL has not taken off in Ireland. On 1 October 2002 there were only 26 fully unbundled lines and 62 shared access lines, all available to the same new entrant. These numbers have increased since: the number of unbundled lines by July 2003 was 209 for full unbundling and 715 for line sharing. However, these numbers are disappointing when compared with the uptake in many other EU countries.

A1.9.2 Basis for setting ULL charge

Cost base: CCA

Cost standard: LRAIC

Cost of capital: 12 per cent[42]

A1.9.3 Clarity of regulatory objectives

The cost standard is LRAIC, although the exact specifications are still being developed. (The regulator has been working with the incumbent and other industry members to produce a bottom-up forward-looking LRAIC model of the access network.) The regulator expected prices to fall when moving from historic costs to LRAIC,[43] although eircom has produced LRAIC estimates that are higher than the historic costs.

A1.9.4 Scope of pricing methodology

Direct network capital expenditure is derived from a bottom-up model. The assets are worked out from a sample of the incumbent data and making adjustments to them to follow the incumbent's current dimensioning rules. The model seeks to estimate the capital costs of an efficient entrant running an access network providing the services currently provided by the incumbent's access network.

The same methodology is used to calculate charges for full and shared access to the local loops.

Co-location costs are calculated using a bottom-up methodology. The incumbent exchanges have been independently valued to produce a market rental per square metre per exchange.

A1.9.5 Transparency of inputs

The model uses Excel, and a version is available showing all the inputs and algorithms (apart from confidential data). Moreover, the process of developing the approach to setting ULL prices

[42] Since 1 April 2004 the cost of capital has changed tp 11.5 per cent.
[43] Page 8, Comreg 03/55.

has been, and continues to be, open to involved parties. The regulator is launching a consultation process regarding the methodology for direct operating expenditure and other costs.

A1.9.6 Price squeeze/non-discrimination

In its note on 21 February 2003, the regulator states that wholesale line rental prices must be cost orientated. Further, as indicated in the price-cap consultation (ODTR 02/96), the incumbent is considering implementing a "glide path" to a rebalanced position for line rental. The regulator states that after the first year, a glide path to the full cost base should be set for WLR over the same period as the glide path for line rental. Margin squeeze tests will apply in the glide path period as necessary.

It seems that the regulator is aware of price (or margin) squeeze issues in some circumstances:

> "Until 3rd February 2003, eircom was subject to a retail price cap which meant that it must, inter alia, reduce its prices for a basket of retail products by CPI-8 each year. In ComReg 03/14 3 it was announced that the overall basket cap would be CPI – 0 effective from 4th February 2003 with all sub caps being removed. Whatever mechanism may be adopted on interconnection prices, it must ensure that all retail operators must equally be protected from problems relating to margin squeeze on a non-discriminatory basis."[44]

[44] Comreg (2003) "Fixed Interconnection Charging Mechanisms"

A1.10 Italy

A1.10.1 Background

Agcom, the telecommunications regulator, has been actively involved in promoting unbundling by drawing up a list of the first 500 places to launch the commercial phase of the local services 35 companies were interested in providing. The service would cover the whole country by expanding gradually. As a result of Agcom's interventions, 31 agreements (as at 2002) have been signed for local loop unbundling, and two for shared access. By July 2003 the number of fully unbundled lines in Italy was 309,000 – a 276 per cent increase on the previous year's number.

At the end of September 2002 new entrants, through the use of Telecom Italia's wholesale bitstream access service, were offering 105,000 lines. Furthermore, new entrants were offering DSL via unbundled loops (at the time about 60 percent of ULL lines activated were used to offer DSL services) and were thus offering another 42,300 DSL lines on the retail market.

The numbers of wholesale bitstream access lines rapidly in less than a year's time numbering 400,000 as at July 2003 – the highest in the EU at the time.

A1.10.2 Basis for setting ULL charge

Cost base: Benchmarking on the basis of HCA

Cost standard: FDC

Cost of capital: 13.5 per cent

A1.10.3 Clarity of regulatory objectives

Reasons for using the current methodology have not been explicitly stated. The slow take-up rate was stated as one reason for moving from pure historic cost to benchmarking. The regulator wanted to move towards a measure closer to "efficient" cost.

The price has fallen as a result, something that was expected by the regulator.

Eventually, the regulatory intend settings ULL charges using current costs and a LRAIC model, but the methodology for the access network is still being developed.

A1.10.4 Scope of pricing methodology

At the moment, the ULL charge is derived using a benchmarking exercise. Starting with historic costs, the regulator takes into account other considerations (i.e. possible efficiency improvements, over-dimensioning of the current network) and derives what is a measure of benchmark efficient costs.

The methodology based on historic costs and benchmarking applies directly to full ULL, but "is similar to shared access and co-location".

All co-location rental fees (per m^2) are based on national averages of regulatory accounting data for 2001.

A1.10.5 Transparency of inputs

The cost of capital is derived using the WACC.

A1.10.6 Price squeeze/non-discrimination

The NRA seems to be aware of possible price squeeze and non-discrimination issues. Possible implications of setting wholesale charges and capping retail tariffs are discussed. Two imputation tests for price squeezes are set to ensure non-discriminatory pricing.

1 For each service, the price floor would be equal to the efficient level of costs incurred by the retail division of the incumbent operator in providing the service in question, facing the same wholesale tariffs offered to other operators.

2 For each service, the price floor would be equal to an efficient level of costs incurred by the retail division of another operator in providing the service in question, including the costs incurred for interconnecting the networks (namely, a leased line and an interconnection kit).

All retail tariffs TI proposes that are below price floor 1 are not authorised. Retail tariffs that are above price floor 2 are automatically authorised. Retail tariffs in between the two price floors are subject to further controls.

In addition other measures have been established:

- There is accounting separation of the wholesale and retail divisions of TI.
- Wholesale products will be offered to TI retail division under the same terms/conditions offered to any other retail division; and the quality of the offered products will be checked to ensure it is the same for every operator.
- Information on wholesale traffic of competitors will not be shared between TI wholesale and retail divisions.

A1.11 Netherlands

A1.11.1 Background

In March 1999, NRA (OPTA) issued guidelines on access to the ULL. These guidelines also qualified as policy rules. The guidelines discussed the process of settlement of disputes concerning special access to the unbundled local loop and the methodology for setting cost oriented tariffs for special access to the local line.

OPTA's guidelines of March 1999 enabled new entrants to gain access to the incumbent's network. Full ULL first became available in June 2000. However, in the Netherlands there was a delay in designating an authority that would be in charge of implementing the EU Regulation on unbundled access to the local loop. This could be considered as a possible obstacle to faster uptake of ULL. OPTA was finally charged with this task in 2002, but around that time some new entrants faced with financial problems withdrew from the market.

In October 2002 only 18,240 fully unbundled lines and 8,091 shared lines were available to the new entrants. In the first six months of 2002, the market share of the incumbent for local access lines went down from 94 percent to 89 percent as a result of unbundling. By July 2003, only 10,000 extra fully unbundled lines were offered. However, the increase over the same period has been much more significant for shared lines; 64,738 lines – the highest number of shared lines offered among EU countries.

The wholesale bitstream access offer of the incumbent was withdrawn at some point and was made available again at the end of 2002.

A1.11.2 Basis for setting ULL charge

Cost base: CCA

Cost standard: Embedded Direct Costs

Cost of capital: 10.7-13.4 per cent

A1.11.3 Scope of pricing methodology

The guidelines determined that the tariffs are calculated on the basis of the Embedded Direct Costs model. In relation to the cost base that should be used, OPTA's guidelines determined that there should be a gradual transition period from a tariff based on historical costs to a tariff based on current costs. A transition period of five years was decided. Tariffs are estimated using the following formula:

$$P_t = P_t^H + \frac{t}{5}\left(P_t^C - P_t^H\right),$$

where,

- P_t^H is the tariff in year t based on historical cost price,
- P_t^C is the tariff in year t based on current cost price,
- t/5 is the time factor by which t refers to the year in which the tariff is determined, and 5 refers to the number of years in which a tariff based on current costs must be reached.

The formula was gradually giving more relative weight to the CCA cost price component and after the fifth year the tariff would be based entirely on current cost accounting.

A1.11.4 Price squeeze/non-discrimination

Concerns about a margin squeeze because of falling end-user prices associated with relatively constant interconnection tariffs led to a consultation process in 2000.

The initial consultation document suggested a lower limit for end-user tariffs for providers with significant market power. To determine the lower limit, a price squeeze test was to be used. The proposed price-squeeze test would examine whether the margin between the end-user tariffs charged by the vertically integrated provider (KPN) and the costs that a provider would incur if it were to purchase network capacity from itself, under the same conditions as other providers, is such that efficient service providers are still able to make normal profits. The test would make allowances for other costs not included in the interconnection tariffs, such as billing, marketing and overheads, and adjusts for discounts.

After the consultation process, the regulator produced guidelines giving details of the price-squeeze test for the incumbent's services. The price-squeeze test is applied separately for each service, tariff and time period (peak, off-peak etc.).

The calculation of the retail increment is based on the costs of an efficient alternative operator. The retail charges of the provider having significant market power are applied to estimate the costs of an efficient provider.

A1.12 Portugal

A1.12.1 Background

ANACOM, the regulator, mandated ULL in December 2000. The first reference offer was published in March 2001. A revised RUO was published in October 2002.

The co-location service in Portugal includes co-location of modules in operator's room and co-mingling. Co-mingling is available since the beginning of 2003 following a decision issued by ANACOM.

As of September 2002, 100 Main Distribution Frames were offered for local-loop unbundling, corresponding to 1,647,000 lines. However, the evolution of local-loop unbundling has been disappointing. At the same time only 27 lines were fully unbundled – the number increased to 303 by July 2003. The main problems identified in the 8th implementation report related to the lack of financial investment by new entrants in the equipment necessary for local-loop unbundling and the relatively high prices.

There had been no requests for bitstream access as of September 2002.

A1.12.2 Basis for setting ULL charge

Cost base: Historic costs for services and/or service elements which were available from the incumbent's accounting system.

Current costs for services and/or service elements which were not available from the incumbent's accounting system.[45]

Cost of capital: 13 per cent.

A1.12.3 Clarity of regulatory objectives

ANACOM indicates that ULL charges should promote the development of a sustainable and fair competition. The "info-inclusao" is explicitly mentioned as an objective to be achieved through the ULL.[46] Geographically averaged charges (as opposed to charges by geo-type) are preferred. This is because they would not only promote the "info-inclusao", but they would also provide an incentive for operators to roll out alternative infrastructure in densely populated areas.

The incumbent operator is required to produce a reference offer with access charges that are cost orientated. Historic costs, alongside additional information on the evolution of costs and

[45] ANACOM's assessment of ULL prices was based on cost estimations derived from PTC's (the incumbent) cost accounting system (top-down, HC, FDC and Activity Based Costing type model) for services and/or service elements already provided by PTC, taking also into account efficiency criteria. Costs for new services and/or service elements, which were not available at the cost accounting system, were estimated based on current costs.

[46] The info-inclusao refers to the desire to offer a variety of services (including internet) at a low price to those citizens who live in rural and less urban areas and who do not have access to quality infrastructure.

productivity, are used to estimate the charges.[47] Current practice in the EU is also considered for additional reference purposes.

The regulator is aware that the methodology adopted in the Netherlands (gradual transition from historic to current costs) might lead to higher charges.

ICP believes that cost-oriented charges, if properly implemented, would avoid the rolling out of alternative infrastructure that is not economically viable.

A1.12.4 Transparency of inputs

The model has not been made publicly available.

A1.12.5 Price squeeze/non-discrimination

The regulator is aware of the close relationship between ULL wholesale charges and retail tariffs for access products, since it highlights the similarity of the cost components involved in the two products and advocates for consistency in the corresponding charges.

In particular, the consultation document states that where different price methodologies are used to determine retail tariffs and wholesale charges, the wholesale charges can be higher than the retail price. This might raise concerns that a new entrant cannot compete with the incumbent and earn a margin. However, the consultation document notes that comparing the range of wholesale tariffs against a single retail tariff may be misleading. Line rental is not a perfect substitute to the range of services that an entrant might offer end customers. Hence, even if there is a margin squeeze on narrowband services, it might be possible for an entrant to earn a high margin when offering high-bandwidth services.

[47] For more details see section A1.12.2.

A1.13 Spain

A1.13.1 Background

ULL was legislated and mandated by royal decree in December 2000.

The incumbent's (Telefonica) first Reference Offer (OBA) was approved, with a set of modifications, by CDGAE (the Spanish Government Commission on Economic Issues) in December 2000 and published in January 2001. The national legislation, however, attributes the task of setting technical and economic conditions of the subsequent access offers to the NRA, i.e. Comision del Mercado de las Telecomunicaciones (CMT).

CMT decided to keep the charges' path established in December 2000 by the CDGAE for the period 2001-2003, to allow for continuity in wholesale charges.

The CDGAE fixed an initial charge for 2001 and set up price reductions for 2002 and 2003, taking into account "costs and revenues accrued to Telefonica de Espana from the provision of the services provided over the local loop".

Only caged and distant co-location was initially available; since June 2001 Telefonica has also been required to provide cage-less co-location. Co-location charges are set by CMT on the basis of current costs using a bottom-up model.

Virtual co-location is made available on commercial terms with a special agreement.

Uptake of ULL in Spain was relatively fast considering that by the beginning of 2002 there were only a few local loops unbundled. By 1 October 2002 (only a few months since the adoption of 2002's RUO in April) 1,181 local loops had been unbundled, representing a total of six agreements. This rapid increase was partly due to the fact that new entrants were waiting for the regulator to review the RUO and were expecting that the prices would be lowered. However, it should be noted that the increase in the following year was sizeable as well; 9,749 lines were offered by July 2003 representing a 725 per cent increase on the previous year's figures. By July 2003 no loops were in shared use due to a lack of demand.

The obligation to provide bitstream access was introduced in Spain in March 1999. In January 2001, this obligation was incorporated into the RUO and by July 2003 there were more bitstream lines offered in Spain (308,514) than anywhere else in the EU besides Italy.

A1.13.2 Basis for setting ULL charge

Cost base: Not clear. The ULL charge was set up in 2000 by the CDGAE on the basis of a cost submission by Telefonica.

Cost standard: LRAIC

Cost of capital: 12.34 per cent

A1.13.3 Clarity of regulatory objectives

Cost orientation is deemed to be one of the main regulatory objectives. However, CMT seek to implement cost orientation in a way that would be considered "compatible" with:

- The fostering of a sustainable level of competition;
- The provision of incentives for building alternative infrastructure;
- The need to avoid distortions of competition and, in particular, margin squeezes between wholesale and retail charges.

A1.13.4 Scope of pricing methodology

It is not clear how shared access charges are derived and what their relationship with charges for full unbundled loops is.

CMT established a pre-determined standard price list for co-location, with prices based on average costs and market values, based on a bottom-up study carried out by independent consultants. The results obtained with this methodology were crosschecked with the prices charged by the incumbent to its subsidiaries (resulting in convergent prices). There are two different co-location services (with or without a separate room) with different prices. Four geographical areas with different rental levels are considered.

A1.13.5 Price squeeze/non-discrimination

CMT, in setting wholesale charges, recognises the need to ensure adequate margins between them and retail charges are in place to foster competition in the retail segment (see Commission Decision as of 16 July 2001).

A1.14 Sweden

A1.14.1 Background

Until the July 2003 the uptake of ULL was relatively low in Sweden (less than 5,400 unbundled lines). According to figures published in the 8th implementation report only 1 percent of all digital subscriber lines were routed through unbundled loops. Pricing of ULL was one of the reasons that prevented new entrants from favouring this service since as they stated in the 8th implementation report it did not leave reasonable margins for profit. The regulator however found that prices were cost-oriented.

The uptake of shared lines has been much faster than that of full ULL with 8,787 lines being offered by July 2003.

The uptake of bitstream access lines has been as disappointing as that of full ULL lines (2,300 bitstream lines by July 2003).

A1.14.2 Basis for setting ULL charge

Cost base: CCA

Cost standard: LRAIC[48]

Cost of capital: 15 per cent[49]

A1.14.3 Clarity of regulatory objectives

The NRA (PTS) has recently finished producing a hybrid model in collaboration with other interested parties.

The objectives of, and the expected effects from the LRAIC plus mark up method have been made clear in the Final Reconciliation Report, published 10 October. In summary, they are:

- to develop a reliable model, that is supported by the industry, to calculate costs for access and interconnection according to the LRAIC-method recommended by the Commission; and
- to create a regulatory tool for PTS to be used to establish cost-oriented prices for access and interconnection.

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[48] Some parts of the reply state that historic costs with FDC are still used and the CC/LRAIC model development ends in January 2004, even though elsewhere they say that the current-cost basis has been used since 01/04/2003, evaluated using a LRAIC model.

[49] Fifteen percent is the figure extracted from the answers to the Communications Committee questionnaire sent to all EU NRAs. However, the value of the cost of capital has now been determined to be 12 percent.

- to encourage the use of existing facilities of the SMP operator where this is economically desirable, avoiding inefficient duplication of infrastructure costs by new entrants (incentive to buy);

- to encourage investment in new facilities where this is economically justified by new entrants investing in competing infrastructure rather than the SMP operator upgrading and expanding its networks (incentive to build);

- to increase the transparency of the cost calculations underlying the access and interconnection charges; and

- to increase predictability of access and interconnection charges for both the SMP operator and other operators.

A1.14.4 Scope of pricing methodology

Currently, the charge for shared access does not include any costs of the copper line. All costs are born by the full access. Pricing for shared access is based on incremental cost. The price for shared access (for different services) is derived from the difference between the prices for full access and a copper product used for plain-voice telephony, plus an administration fee.

For the final hybrid model, PTS intends to review the allocation keys for full access and shared access to ensure that the relevant shared costs are allocated equally to PSTN and shared access, implying that the resulting cost of shared access will be half the costs of full access.

A1.14.5 Transparency of inputs

The industry has been invited to participate in the development of the new LRAIC model, to be completed in January 2004. The incumbent has developed a top-down model and the other operators a bottom-up model. These have been reconciled into a hybrid model by the regulator, in collaboration with the interested parties.

PTS states that to send the right investment signals and promote efficient competition, prices should reflect the LRAIC of an efficient operator facing the demand of the existing SMP operator. The efficient operator is defined as the theoretical operator that would exist if it were in a fully competitive market in Sweden, but with the same scope and demand of the existing SMP operator.

The model is publicly available, the inputs are clear and there is discussion about depreciation methods as well as price trends.

The cost of capital seems to have been estimated through WACC, with CAPM numbers for equity capital.

A1.15 UK

A1.15.1 Background

In November 1999, Oftel, the British Telecommunications regulator, issued a statement that required the incumbent, British Telecom (BT), to make its local loop available to other operators. This requirement for providing ULL was mandated through a condition added on BT's licence in April 2000. This condition specified the kind of elements BT is required to provide for the implementation of ULL (e.g. the local loop) and was brought into effect in August 2000. Following that, Oftel set initial wholesale prices for ULL in December 2000.

The uptake of local-loop unbundling has been relatively poor in the UK. According to the 8th Report on the Implementation of the Telecommunications Regulatory Package, even though around 200 exchanges were equipped for ULL, and by the end of August 2002 the number of completed co-location facilities had risen to 136, only 12 operators were providing services using ULL by the end of 2002. There had been very little uptake of fully unbundled lines (1,600 by mid-October 2002) and no requests for shared lines. These numbers changed only a little for full ULL by July 2003, when 3,567 lines were offered. However, shared access lines rose from zero in 2002 to 2,305 in July 2003.

A1.15.2 Basis for setting ULL charge

Cost base: CCA

Cost standard: LRAIC

Cost of capital: 13.5 per cent

A1.15.3 Clarity of regulatory objectives

Oftel's Statements of August 2000 and December 2000 provided that charges for unbundled loops should be set so as to:

- permit recovery of an appropriate attribution of common costs;
- permit the recovery of long run incremental costs reasonably and necessarily incurred by BT in or as a result of the provision of these services; and
- include a reasonable return on capital employed.

A1.15.4 Scope of pricing methodology

With regard to the price of full and shared ULL, Oftel has set some basic principles presented in a Statement issued by Oftel in December 2000.[50] These are high-level principles and are used to establish the initial price of shared loops and any ongoing adjustments.

- The price of the loop will be cost-oriented and set on the basis of reasonably and necessarily incurred long run incremental costs (LRAIC).
- Charges for other necessary inputs, e.g. tie cables, should also be on the basis of reasonably and necessarily incurred LRAIC plus mark-up.
- BT should be able to recover the costs incurred in setting up order-handling processes, as well as the costs incurred as a result of dealing with operators and maintaining the service.
- The starting charge will be geographically averaged, but BT may request geographically de-averaged prices if this can be shown to be justified by differences in the underlying costs.

According to Oftel these principles are to be applied to both shared and fully unbundled loops when setting the prices for both these services due to the similarities between the two.[51]

Additionally, most of the detailed charging principles developed in the context of fully unbundled loops apply equally to shared access. Oftel, therefore, employs these principles when determining the charges for shared loops.

The charges for shared access to the local loop are based on the same pricing principles that have been adopted to determine the charges for fully unbundled loops. The main difference is the absence of any contribution in the charges for shared access to joint and common costs incurred by BT in the provision of shared lines. Oftel stated in its December 2000 Statement that the charges for shared loops should not include any contribution to the recovery of joint and common costs incurred by BT in the provision of shared lines. The rationale behind this decision was that BT was already recovering all the common costs associated with the provision of local loops through the low frequency portion of the loop (i.e. both through the PSTN rental and the call charges).

The price for co-location space is not set by Oftel but by BT. The charge is set on the basis of a number of factors such the market rate for the location of the exchange, the area occupied by the operator and the equipment to be installed in the room.

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[50] "Access to bandwidth: shared access to the local loop"
[51] "Access to bandwidth: shared access to the local loop", December 2000.

A1.15.5 Price squeeze/non-discrimination

The non-discrimination principle applies, i.e. BT's downstream businesses using shared lines have to pay the same charges (including the same contribution to common costs), as BT's competitors that take shared loops.

This is explicitly stated in BT's licence on paragraphs concerning "access network facilities".

> "The Licensee shall not (whether in respect of the charges or other terms or conditions applied or otherwise) show undue preference to, or exercise undue discrimination against, particular persons or persons of any class or description as respects the provision of any of the matters to which this Condition relates.
>
> The Licensee may be deemed to have shown such undue preference or to have exercised such undue discrimination if it unfairly favours to a material extent a business carried on by it in relation to the doing of any of the things mentioned in paragraph [X][52] so as to place at a competitive disadvantage Service Providers competing with that business."

Oftel has completed an investigation into an alleged margin squeeze between the incumbent's retail and wholesale DSL. Shortly after re-opening the investigation for an alleged margin squeeze by the incumbent, BT's wholesale price was reduced. Oftel considered the various reductions of the wholesale and retail prices since launch and start of the investigation. In its final conclusion in March 2002 that there was no unfair cross-subsidy or margin squeeze between the new wholesale and retail prices.

[52] X refers to the previous paragraph.

APPENDIX 2: NETWORK FACTORS

A2.1 Network Factors

Differences between access networks across EU Member States can arise for a number of reasons. We shall classify these into the following three categories:

- demographic;
- meteorological; and
- topographical factors.

A2.1.1 Demographic factors

Demographic factors are likely to be the major source of difference in the way that access networks are built in EU Member States as they concern the way in which customers are actually connected to the exchanges. Given that customer premises are fixed and there is usually an obligation for the incumbent operator to connect them to the network, the demography of a particular Member Sate is difficult for incumbent operators to influence.

Demographic factors can be summarised as referring to:

a) the size of the population relative to the country's surface; and

b) the population distribution, i.e. the percentage of population living in conglomerates of different sizes.

Consider two countries featuring the same population density (average number of customers per square kilometre) but completely different population distribution: for example, one country might feature a number of medium-large size cities (e.g. Italy) and another feature a large number of small towns and villages and one large conurbation (e.g. Ireland). On the other hand, one country can exhibit the same population distribution as another, but have a much larger subscriber base or differences in the mix of subscribers (for example, business vs. residential).

The importance of demographic factors is due to the relevance of economies of scale in a cost function that exhibits, overall, quite a flat cost/volume relationship. In other words, the cost of serving an additional customer is quite low, compared with the average overall cost per line, if the customer is next door to a customer that is already being provided with a connection. This cost would correspond to the cost of a Network Termination Point (NTP), the unit cost of a copper pair and a share of the maintenance costs associated with it.

On the other hand, the cost of connecting another customer to the network is quite high if the customer happens to be located in a remote area and cannot share at least part of the network infrastructure (what is usually called the distribution part of the network) with the existing customers. On top of the costs identified above, this customer would cause the incurrence of digging costs needed to connect him/her to the main network.

In other words, customers in towns are better able to share infrastructure, the most relevant cost category of the access network, than customers living in small countryside villages. The overall size of the population is, moreover, quite relevant when spreading corporate costs over all the customers (assuming these costs do not increase in direct proportion with the number of customers).

Another dimension of demography that might be relevant to the network average cost is the split between residential and business customers. This split affects the relevance of economies of scope, with business customers usually asking for more services through the use of the same network connection.

However, we do not consider this distinction for the purposes of this study since Member States do not seem to differ substantially when it comes to this dimension. Distinguishing between this demand factor would not help understand ULL differences around Member States.

A2.1.2 Meteorological

The access network is about providing physical connections from the customers' dwellings to the MDF (the boundary with the core network) and it is therefore by its nature exposed to the elements. The meteorological factors are aimed at capturing the impact of different weather conditions on the structure of the network and its maintenance costs.

The meteorological factors that we believe are more likely to have an impact on the network structure and its maintenance costs are the following:

- **Precipitation levels**. Rain can cause maintenance problems not only to aerial cable but also to underground cables where excessive water can find poor joints and corroded cables.

- **Extreme temperatures**. Temperature excursions might have an impact on unpressurised cable; freezing temperatures might affect underground cables.

- **Wind**. High winds will affect cables on poles.

Different countries facing different meteorological conditions can take different views on the following trade-offs:

a) Pressurised cable vs. non-pressurised cable. Pressurised cable is more expensive to install but it is more resilient to the elements.

b) Proportion of cable laid underground as opposed to cable hung on poles. Cable on poles is much cheaper to install than underground cable (by up to a factor of ten), but it is more expensive to maintain.

c) Proportion of underground cable put in ducts (or conduits) rather than cable simply buried in the terrain.

A2.1.3 Topological

The single most important broad cost category of any access network is its infrastructure (i.e. trenches, cable, poles etc.).

Clearly, the topology (i.e. the surface features) of a country plays an important role in the structure and the associated costs of its access network. It is much harder to install cable in hard, mountainous terrains than in soft, plain ones.

Bottom-up cost models usually allow for different terrain types when estimating the cost of an access network (e.g. the Proxy model developed for the FCC in the US allows for many of different terrain types).

Different countries facing different topological conditions can take different views on the following trade-offs:

- Proportion of cable laid underground as opposed to cable hung on poles. The trade-off between capital and maintenance costs (see above) of underground as opposed to aerial cable becomes more relevant the harder (and more expensive) to install cable under the ground.

- The usage of different technologies. Copper technologies might become less economically efficient than other well established technologies (e.g. wireless) for countries featuring given topological characteristics: for example, setting an antenna on top of a mountain might allow the network to reach a given number of customers in a more efficient way than plugging underground cable.

APPENDIX 3: OVERVIEW OF POLICY OBJECTIVES

Official guidance regarding policy objectives for unbundled access to the local loop can be found in the following documents:

- The 26/4/2000 "Commission Recommendation on Unbundled Access to the Local Loop";
- Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop;
- Communication from the Commission (26 April 2000) on Unbundled Access to the Local Loop: Enabling the competitive provision of a full range of electronic communication services including broadband multimedia and high-speed internet;
- Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive);
- Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive);
- The joint Commission-ERG Remedy paper to be adopted early 2004.

Taken together, these documents provide an indication of the Commission's vision for ULL in Member States.

The preamble in the Commission Recommendations 26/4/2000 implied that an important goal of ULL was to bring about "a substantial reduction in the costs of using the Internet". Paragraph 6 of Article 1 also states that:

> "For as long as the level of competition in the local access network is insufficient to prevent excessive pricing of unbundled access to local loops, it is recommended that prices for unbundled access to local loops follow the principle of cost orientation. In principle a forward-looking approach based on current costs will foster fair and sustainable competition and provide alternative investment incentives; however, if this could result in distortions of competition in the short term, for example where the notified operator's end user tariffs remain unbalanced on the basis of current costs, then it is recommended that the national regulatory authority, following the procedure of point 5, specify the reasonable time period necessary for the gradual adjustment to current costs of the price of local loops, while keeping consistency with the cost system used when regulating retail services".

Current costs are defined in a footnote as the costs of building an efficient modern equivalent infrastructure and providing such a service today.

Commission Recommendation 26/4/2000 was adopted before the downturn in the market and before experience could be acquired in a sufficient number of Member States. It could be

therefore that the Commission favours current costs as a longer term objective, but recommends the NRAs apply other approaches in the short term, where current costs would lead to distortions of competition. Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop restates the desire of local loop unbundling to help bring about a substantial reduction in the costs of using the Internet and discusses how such reductions may take place:

> "Unbundled access to the local loop allows new entrants to compete with notified operators in offering high bit rate data transmission services for continuous Internet access and multimedia applications based on digital subscriber line (DSL) technology as well as voice telephony services. A reasonable request for unbundled access implies that the access is necessary for the provision of the services of the beneficiary, and that refusal of the request would prevent, restrict or distort competition in this sector."

The Regulation notes that it prefers commercial negotiation as the method for reaching agreement on technical and pricing issues, but recognises that the national regulatory authority may intervene in order to ensure "fair competition, economic efficiency and maximum benefit for end-users."

With regard to cost and pricing rules, it states:

> "Costing and pricing rules for local loops and related facilities should be transparent, non-discriminatory and objective to ensure fairness. Pricing rules should ensure that the local loop provider is able to cover its appropriate costs in this regard plus a reasonable return, in order to ensure the long term development and upgrade of local access infrastructure. Pricing rules for local loops should foster fair and sustainable competition, bearing in mind the need for investment in alternative infrastructures, and ensure that there is no distortion of competition, in particular no margin squeeze between prices of wholesale and retail services of the notified operator."

The Regulation no longer refers to a specific pricing methodology. It clarifies that whatever the methodology chosen it should avoid distortions of competition.

Under Article 16 Framework Directive, NRAs must, as soon as possible after the adoption of the recommendation, carry out an analysis of the relevant markets. Given that access to the local loop, including shared use, is one of the 18 markets identified in the Commission recommendation of 11 February 2003, NRAs must review whether in this market the incumbent is still dominant. In such cases, the NRA shall impose appropriate specific regulatory obligations on that undertaking or maintain or amend such obligations where they already exist. According to recital 27 of the Directive, such obligations are only required where competition law remedies are not sufficient to address the relevant problem. As regards the local loop, the problem is the need to obtain access on conditions allowing the entrant to compete with the retail services of the incumbent since, as the Commission states in the explanatory memorandum to the Recommendation of 11 February 2003, "the only reasonable widespread means of supplying the end user market is over the local access network loops of the PSTN which have been enhanced to provide broadband access services" (p. 26).

Once NRAs have defined appropriate remedies in the markets for unbundled loops ensure competition in retail broadband markets, the Commission will bring forward a proposal to repeal Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop.