Commission for
Communications Regulation

Consultation Paper

Local Loop Unbundling Costing Consultation

Direct and Indirect Operating Expenditure Econometric Modelling

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All responses to this consultation should be clearly marked:- "Reference: Submission re ComReg 04/21" as indicated above, and sent by post, facsimile, e-mail or on-line at www.comreg.ie (current consultations), to arrive on or before 17h30, on 26th March 2004, to:

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Please note ComReg will publish all submissions with the Response to Consultation, subject to the standard confidentiality procedure.

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1 Foreword

The widespread availability of affordable broadband internet access is universally recognised to be vital to the future interests of Irish consumers and businesses. As recognised at the Lisbon Summit of 2000, Local Loop Unbundling (LLU) is integral to promoting competition in the provision of broadband services and delivering the benefits of these services to consumers. Unfortunately, the take-up of broadband in Ireland lags significantly behind most of our European partners.

Competition in the provision of broadband services utilising the eircom local access network, made possible by LLU, has yet to develop in the anticipated fashion. Clearly, the setting of appropriate prices for access to the eircom network by competing operators is essential for the development of competition.

This consultation paper sets out for comment ComReg's proposals on some of the points related to the determination of the charges other operators face for use of eircom's copper wire network. Thus far eircom and ComReg have not been able to agree on particular aspects of deriving an appropriate cost for eircom's access network and ComReg believes that in the interests of transparency, it is appropriate to invite comment on these matters from other interested parties.

This paper in particular invites comment on the general principles surrounding the appropriate amount of operational expenditure that should be included in a bottom up Long Run Incremental Cost (LRIC) model of the access network. ComReg also proposes its own view and invites comment on how an appropriate measure of these amounts might be derived in practice.

John Doherty,
Chairman

2 Executive Summary

The introduction of Local Loop Unbundling, (LLU) has been contentious and time-consuming since its introduction in January 2000, and the implementation of a set of prices for the products have been the most contentious of all. ComReg and its predecessor, the ODTR, have made a number of decisions over the last few years directing eircom to change its prices and on each occasion, eircom has challenged those decisions by way of Judicial Review proceedings.

The level of operating expenditure as an appropriate input to LLU pricing has been one of the areas of disagreement between ComReg, eircom and the Other Authorised Operators, (OAOs) and the modelling described within this consultation paper, together with the responses to be received as a result of this publication, will form an important part of ComReg's review of eircom's pricing submission for the LLU products for the period from April 2004 to March 2005 and beyond.

This consultation is concerned with the appropriate estimation of operating expenditure. ComReg is additionally consulting on the issues of appropriate network design parameters and network element costs in a consultation to be published shortly. These two consultations should be read together in order to understand their background, the reasons for consulting and indeed the areas on which we are consulting.

Availability of data with regard to direct and indirect operating expenditure in support of telecommunications copper access networks, other than that available from eircom, is very scarce within the EU. Therefore, ComReg has had to look elsewhere for data which can support its review of eircom's pricing submission for LLU pricing. The United States of America, in the form of its Local Exchange Carriers, (LECs) provides a substantial data-set produced in a consistent manner both across the thirty-one LECs and across over a decade.

ComReg used an analysis of the LECs' data as an input to its directions to eircom for the LLU product pricing for the period from April 2003 to March 2004. However, eircom challenged those directions by way of Judicial Review proceedings, (subsequently settled out of court), citing its discontent with, *inter alia*, the level of operating expenditure allowed as an input to the pricing. ComReg and its consultants have therefore conducted an econometric analysis of the LECs' data in support of its present and future review of eircom's LLU pricing submissions.

The econometric modelling seeks to explain, in statistical terms, the differences between operating costs of different LECs and in different years. Once a model has been developed, it can be used to produce estimates for what the operating costs would be expected to be of other companies not in the original set of companies, in this case eircom. Therefore whilst being cognisant of currency and wages conversions, the econometric modelling can be used as a tool to review the reasonableness of those inputs submitted to ComReg by eircom as part of an LLU pricing submission.

The modelling provides estimates of a level of operating costs that have in practice been achieved by a large number of operators. The average does not show what costs the more efficient LECs incur, indeed due to the fact that these figures will reflect the operating costs of companies operating with assets of various ages, it will not produce the lowest input for operating expenditure and therefore may not reflect the benefits of the hypothetical new network such as that of the LRIC model whose capital costs eircom would be allowed to recover in LLU charges. However, ComReg believes that the econometric modelling is the best tool currently available for the review of operating expenditure inputs to eircom LLU product pricing.

3 Introduction

3.1 Local Loop Unbundling

The "local loop" is the copper pair connecting an individual telephone subscriber to the nearest point of interconnection with the main telephone network at the local exchange. This "last mile" of network is accepted to be the most difficult for new entrants to replicate. "Local Loop Unbundling" (LLU) implies that the network owner is required to provide access to this copper pair, so that new entrants can offer their services across the local loop. This allows new entrants to provide a full range of services directly to the customer. In particular, new entrants can offer the new range of broadband services (such as high-speed Internet access) even if the incumbent operator has not chosen to offer such services. As a result, local loop unbundling has the potential to increase the range of competing services available to businesses and consumers.

The European Commission Recommendations on Unbundled Access to the Local Loop of 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". The access network is wider than local loops and includes line cards. Line cards are the pieces of electronic equipment that connect customers to the core network and manage the individual lines. These are provided by new entrants themselves when they purchase Unbundled Local Loops from the incumbent. Other access technologies such as fibre and wireless are also by convention excluded from the local loop network. What is of interest for this Consultation Paper is the cost of the local loop component of the access network, denoted as the local loop network.

The widespread take-up of broadband services remains of critical importance to Irish businesses and consumers. Since the year 2000, Ireland has lagged significantly behind most OECD countries. Competition has not developed at the rate anticipated, and the take-up of LLU by Other Authorised Operators (OAOs) has been disappointing. Among the possible reasons for this is the level of eircom's charges to OAOs for local loop unbundling.[1]

In addition, to the extent that retail line rental is regulated with reference to its underlying costs, the cost for LLU is an important input.

While prices should clearly be set at levels that promote competition and enhance consumer welfare, they must also allow eircom an appropriate return on investment so as to encourage continued investment in the network or, in time, in alternatives.

[1] A recent study by the OECD noted: "It is difficult to undertake appropriate monthly pricing benchmarks for LLU from this comparative study due to the limited available information. However, in some countries, such as Denmark and Sweden, relatively low monthly charges facilitated LLU implementation, *whereas other countries, such as Ireland and the UK, have made slow progress due to relatively high charges for unbundled loops*." (OECD DSTI/ICCP/TISP (2002) FINAL 10 September 2003 "Developments in local loop unbundling".) Emphasis added.

Unduly low prices might encourage entry of new suppliers into the market for services using the local loop, but fail to provide sufficient incentive for continued investment in the network. The balancing of these objectives is a complex matter; however, ComReg notes that eircom's current prices for LLU are amongst the very highest in Europe.

ComReg's Consultation Paper 03/146, "Market Analysis: Wholesale unbundled access (including shared access) to metallic loops and sub-loops" published on 11 December 2003 provides a full description of the local loop and of the telecommunication services that it makes possible. This paper is without prejudice to the outcome of that review.

3.2 Guidance from the EU

At the Lisbon summit of March 2000, it was agreed that Local Loop Unbundling was required as a matter of urgency in order for Europe to reap the full benefits of the Internet and electronic commerce, noting that

> *"For Europe to fully seize the growth and job potential of the digital, knowledge-based economy, businesses and citizens must have access to an inexpensive, world-class communications infrastructure and a wide range of services. The Member States, together with the Commission, are called upon to work towards introducing greater competition in local access networks before the end of 2000 and unbundling the local loop in order to help bring about a substantial reduction in the costs of using the Internet."*

The desire to introduce LLU was given effect in Regulation (No 2887/2000) of the European Parliament and of the Council of 18 December 2000.

The European Commission also provided guidance on how the price of unbundled local loops should be set. EU Regulation 26/4/2000 "Commission Recommendation on Unbundled Access to the Local Loop" discusses cost concepts, and paragraph 6 recommends 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 providing alternative investment incentives;...."*

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

> *"For the purposes of calculating the cost of efficient provision of services, national regulatory authorities may use cost accounting methods independent of those used by the undertaking."*

3.3 FL - LRIC as the basis for charging

ComReg and its predecessor, ODTR, have repeatedly argued that Long Run Incremental Cost (LRIC) provides the appropriate basis for the computation of cost oriented LLU prices.[2] This approach has also been followed by other telecommunication sector regulators, including those in the UK and in the USA, and it has received support from the EC. This is in contrast with some other sectors, in which regulators have sometimes based price limits on the costs of maintaining the existing networks.[3]

Under the forward-looking LRIC (FL-LRIC) approach, however, estimates are made of the costs that would be incurred by an efficient new entrant. In principle, charges based on FL - LRIC costs should, therefore, prevent customers being over-charged while allowing an efficient operator to earn normal profit margins, and so provide a sound basis for the development of competition.

A modern, efficient copper local loop network would naturally comprise different assets than those currently in use, some of which might not be needed at all, while others would be replaced by modern equivalent assets.[4] An efficient new entrant would also provide an amount of spare capacity (e.g. through "over-sizing" when laying new connections) that is likely to minimise the future costs of adaptations and expansions.

It is of course possible that either increases or reductions may be needed in an incumbent's present charges and cost levels to bring them into line with LRIC estimates; and it will be of interest to compare the estimated LRIC based charges both with those currently applied by eircom and with those that would be required to give a normal return on assets valued at historic cost.

For example, if eircom has already recovered from customers (most of) the capital costs of duct and of laying copper, then its historic cost accounts will not need to include a capital charge for these large items. On the other hand, it may well be incurring significant operating costs in renewals and maintenance that would not be required if it were using a modern network. Whether cost increases permitted on the swings will outweigh costs disallowed on the roundabouts is an empirical question.

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

3 The difference arises because (as a broad proposition) technology is changing rapidly in telecommunications, with prices of equivalent equipment tending to fall, and the nature of services improving, so that a backward - looking approach would not reflect the outcome of a competitive market. This is less true in some other cases, such as for example water or gas networks, in which a reasonable assumption might be that the existing network will last indefinitely if enough is spent on renewals and maintenance; and that the most reasonable basis for charging for the use of the networks is an estimate of the amount of maintenance and renewals expense required.

4 The need for such an adjustment to operating costs being applied to eircom is acknowledged in Section 6.3.4 of eircom's Accounting Documents: Current Cost and Long run Incremental Cost Statements for Year ended 31 March 2003.

It is clear however that there must be consistency in the estimates. Thus the allowances for operating costs used in a price determination based on LRIC should be the costs of operating an efficient network in an efficient manner, including a reasonable rate of return and depreciation charges reflecting *inter alia* the likely rate of technological change. If cost estimates for the capital required to provide modern ducts and cables based on LRIC principles were to be added to estimates for the costs that are currently incurred by eircom in operating the existing mixed-vintage network, this could lead to serious over-charging.

While LRIC provides a methodological framework for the computation of appropriate costs, there are many contentious issues to be resolved on the implementation of the LRIC methodology.

An Industry Advisory Group (IAG 2) under the independent chairmanship of Professor William Melody was established in order to expedite the introduction of LRIC based charges for services provided by LLU in Ireland by advising ComReg on the development of a bottom-up LRIC model of the access network. IAG 2 included representatives of eircom, OAOs, and ODTR/ComReg and the group met many times between 22nd May 2002 and 5th December 2002. The approach developed by IAG 2 and endorsed by ComReg was to treat the "increment" whose cost is to be estimated as the whole of the local loop network and that is the approach used in this Consultation Paper.

Although eircom was critical of some aspects of the work of IAG 2, the participants had reached consensus on a large number of complex and technical issues regarding the implementation of LRIC costing. ComReg sees little merit in revisiting those issues where consensus was reached. However, on the important issues of the appropriate values to use within the LRIC costing exercise relating to equipment prices, direct operating expenses, indirect operating expenses and non-network capital costs no consensus was reached. Indeed, on these issues eircom's views were significantly divergent from the views of ComReg and the OAOs.

3.4 Purpose of the Current Consultation

On 28 May 2003, ComReg published Decision Notice D12/03 directing eircom to amend its prices for LLU services published in its Access Reference Offer (ARO). This Decision Notice was subsequently challenged by way of Judicial Review by eircom*;* the grounds for appeal included a challenge to the decisions taken by ComReg in relation to those issues unresolved by IAG 2. The Judicial Review was settled before coming to court and it was agreed between the parties that ComReg shall initiate a new process for the purposes of agreeing with eircom new LLU prices to be effective from 1 April 2004, or in default of such agreement, making a new decision fixing LLU prices to be effective from that date.

ComReg has continued its analysis of the issues taking account of both the recommendations of the IAG 2 chairman and the legitimate concerns raised during the process by both eircom and the OAOs. As a result of the further analysis

undertaken, ComReg now feels in a position to share with the industry and other interested parties its current thinking with regard to appropriate levels of direct and indirect operating expenditure as inputs to a LRIC price for LLU. The views expressed below in this consultation are not final conclusions; rather they are approaches that ComReg might use in review of eircom's LLU pricing submission in order to take a view on the appropriate level of both direct and indirect operating expenditure, giving regard to the other assumptions being made in such a submission.

This consultation does not re-open issues on which agreement has been reached, but concentrates on the appropriate values to use within the LRIC costing exercise relating to both direct operating expenses and indirect operating expenses, these issues being amongst those upon which little agreement has hitherto been reached between the IAG2 participants.

ComReg seeks reasoned comments on the proposals in this consultation and in particular would welcome supporting evidence to which we may not otherwise have access from the industry. Any information submitted to ComReg that the respondent wishes to be treated as commercially sensitive should be marked as such.

When submitting responses to this consultation, ComReg would ask that the respondents keep the following factors in mind:

- responses should be consistent with the principles of the LRIC methodology;
- responses should be consistent with the network modelled during the IAG2 process, i.e. an efficient copper access network;
- responses should be consistent with the objectives of promoting competition and benefiting customers; while
- responses should also be consistent with the objectives of adequately rewarding investments made and providing appropriate incentives for future investment.

The purpose of the present Consultation Document is therefore to set out for public consultation how ComReg proposes to review inputs contained within eircom's LLU product pricing submission with regard to direct and indirect operating expenditure with a view to settling these issues in determining the maximum level of charges to be permitted from next April. This makes it an important step forward in offering broadband access to an increasing number of people and businesses.

4 Categories of Operating Expenditure

This section explains the different kinds of operating costs required in providing the unbundled local loop. It also considers whether there are *a priori* grounds for expecting those costs to be significantly different in Ireland than in other countries.

We present several broad categories of operating costs, as explained below. (Individual operators may use different classifications.) Certain kinds of operating expenses are excluded here, notably depreciation (which is calculated as part of the LRIC model of asset costs) and, for this wholesale service, costs relating to customer services.

4.1 Direct Operating Costs

Direct operating costs are so called because they are directly associated with the operation of particular types of asset. The assets required to provide a local loop service are categorised as Network Assets, and Non-Network assets.

Direct network operating costs are the costs directly associated with the operation of network assets, such as those listed below, that are used mainly in the provision of the local loops to the customers' premises. The principal activities to which network direct operating costs refer are 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.).

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 necessarily limited to:

- Underground and overhead (on poles) drop cable;
- Underground and overhead (on poles) distribution and feeder cable;
- Poles;
- Duct and Manholes; and
- Joint boxes

If a separate charge is made for repairs, as is eircom's current practice, the costs involved will need to be separated from those of maintenance.

Direct non-network operating costs are the costs of operating and maintaining assets that are required to support the operation of the network assets described above. The requirement for non-network assets is determined by the extent and nature of the network assets. Unlike the use of network assets, the use of non-

network assets is not directly determined by underlying customer cost drivers such as the number of lines or the extent of calls. Many of these non-network assets are also useful for the provision of other wholesale products, e.g. interconnection services.

Non-Network Assets include, but are not limited to:

- Buildings. The corresponding operating cost category refers to the costs of operating the buildings, (security guards, electricity etc), but might also include the costs of renting building space, (this depends on the specific accounting rules deployed by the operator in question; rents could also be capitalised and accounted as capital cost).

- General Purpose computers. The corresponding operating cost category refers to the wages of the IT department staff.

- Vehicles.

The distinction between direct network operating costs and direct non-network operating costs is important because direct network operating costs can largely be attributed to the LLU products, whereas direct non-network operating costs have to be allocated between providing the local loop and other services.

This category also includes **other operating costs** that result from activities such as:

- Testing. This cost category usually includes the costs incurred in testing telecommunications facilities to determine the condition of plant; receiving, recording and analyzing trouble reports; testing to determine the nature and location of reported trouble condition.

- Plant operation general administration expenses. This includes supervising plant operations; planning, co-ordinating and monitoring plant operations.

- Engineering. This cost category usually includes those costs incurred in the general engineering of the telecommunications plant which are not directly chargeable to an undertaking or project.

4.2 Indirect Operating Costs

Indirect operating costs contrast with direct operating costs in so far as they are incurred to run the business of a telecommunications operator as a whole and not just the access or local loop 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 include, but are not limited to, the following cost categories:

- Executive.
- Accounting and finance.
- Human Resources.
- External Relations.

These are likely to be mainly wage and salary costs.

The LRIC costing exercise for the unbundled local loop must include this type of costs to the extent that they are efficiently incurred and can appropriately be attributed to the local loop network.

To give some indication of magnitudes of these operating costs for other local loop networks, selected broad aggregates are included in Table 5.1 below (these are taken from a set of US Local Exchange Carriers (LECs), which are required to provide detailed accounting data.)

Table 5.1: Selected Operating Costs Categories for Large LECs

Operating Cost Category	Account number	Operating expenses for Year ending 31 December 2000. (US$m)
Direct Access Network Operating Costs[5]	6410.	7,236
Of which: operating costs associated with overhead, buried and underground (i.e. ducted) cable	*6421-6423*	*6,642*
Direct Non-network Operating Costs	6110, 6120, 6510 and 6530: this covers operating costs of assets used by different increments	11,951
Of which testing, engineering and plant operations admin. expenses	*6530+6510*	*6,454*
Of which land and buildings	*6121*	*2,029*
Of which general purpose computers and other assets	*6110+6120-6121*	*3,467*
Indirect operating costs	710: this is for the companies as a whole	7,978

Statistics of Communications Common Carriers, Table 2.10.

It can be seen that most of the direct network operating costs of these US firms comprised costs relating to cable, whether above or below ground. Of direct non-network costs, which are common to other increments and services, the main components comprised costs relating to testing and engineering, to land and buildings and to general purpose computers.

No total for the operating costs of the LECs' access network is provided in this table because only parts of the direct non-network costs and indirect costs should be allocated to the local loop network.

4.3 Factors Influencing Operating Costs

The level of operating costs per line faced by an efficient operator could be affected by a number of different factors.

Plant variables might include characteristics of the assets of the network under consideration, in so far as different asset types and their configuration might affect the level of operating costs.

Demographic variables might include demand features of the network under consideration. Customers in rural areas might give rise to more of these interventions than customers in metropolitan areas, or such interventions may be more costly due to greater travelling time.

Meteorological influences might include forces of nature to which the network under consideration is subject; for example, more extreme environmental conditions might give rise to more faults than a network running in a milder environment. The prevalence of strong winds, of rain, of freezing temperatures, and of extreme heat may influence the interventions and hence affect efficient operating costs.

Other factors resulting in differences in operating costs may include relative wages, and employers' labour tax contributions. Cost differences are also determined by a range of different kinds of regulation, such as regulation of employment and working conditions; any differences in the costs of possessions, (for example, if there are charges levied for blocking roads for repairs); and planning constraints on the location and layout of equipment that differ between jurisdictions.[6]

Q. 1. Are there any other variables that might make operating costs of the local loop network materially different in Ireland from those costs in other countries with which comparisons might reasonably be made and that are not discussed above? If so, what are they and what effects would you expect them to have?

5 Estimating The Allowance For Operating Expenditure

5.1 Need for consistency

As explained in Section 4, the costs of operating a local loop network are the costs of maintaining and managing that network. It is important to be clear why, if eircom's capital costs are to be estimated on the FL - LRIC assumption that they would be those of an efficient new entrant and valued at current costs, then ComReg could not accept eircom's actual operating costs as the basis for setting LLU charges. It is also relevant to explain how ComReg envisages interpreting data relating to eircom's actual operating costs.

Using eircom's actual operating costs for the purpose of setting the limit to charges for the unbundled local loop under a LRIC methodology would be to rely on eircom's efficiency in operating its actual network, which cannot simply be assumed.

Moreover, for estimates of operating costs of the local loop network to be consistent with the estimated FL-LRIC capital costs of the local loop network, they should refer to the LRIC network rather than to eircom's actual network.

These two principles imply that it is not possible to permit eircom simply to include its actual operating costs in LLU charges, even if as in a recent submission by eircom, they are then reduced by a few percent each year to allow for productivity improvements. That prices should fall over time to reflect productivity improvements is an important principle, but it is also necessary that the starting point be an appropriate one.

It appears to ComReg that eircom's actual operating costs are associated with a different network than that estimated in the LRIC model. The value of trench and duct in the LRIC model network is much greater than its value in eircom's accounts, both because the cost of digging trench and laying duct is higher in current prices than it was in previous decades and because more lines are protected in duct. It would clearly be quite wrong to require users to pay both for the costs of a modern network, with assets valued at today's prices, and also to pay for the costs of operating eircom's actual assets, some of which require far more maintenance costs than would be needed for new assets providing a similar service.

Whatever method is used must include providing some assurance on the efficiency of the costs to be reflected in eircom's charges.

The specific assets for which costs are to be recoverable through LLU charges are those calculated according to the model prepared by eircom in the light of the work of IAG 2. As explained in section 3 above, this model is intended to provide estimates of the capital costs to an efficient entrant of running an access network providing the services currently provided by eircom's access network.

This LRIC model followed eircom's current design rules as a guide to current best practice, and these imply a network that is materially different from the actual one. The LRIC model network would use more pressurised duct in order to reduce the number of occasions on which flooding causes faults. It would use more underground duct, in place of the overhead poles currently seen even in urban locations, again with the economic justification including that less maintenance expenditure should be required. The LRIC model also includes significantly more spare capacity in the copper wires in place, in order that less trouble and operating expense is incurred when customers move, or requirements change for whatever reason. It assumes that the assets in use are new, and earn a return on their value at today's prices.

Table 6.1 summarises some of the implications for operating costs, particularly maintenance, of these key differences identified between eircom's actual local loop network and the LRIC network.

Table 6.1: Some major differences between eircom's actual local loop network and the LRIC model network, and implications for operating expenditure

Actual eircom network	LRIC model network	Implication for operating expenditure of using LRIC model network rather than eircom's actual network
Mixture of old and new assets	All new assets	New assets should need less maintenance, and be subject to fewer faults
Incomplete pressurisation of Main network	Complete pressurisation of Main network	Pressurised cable is less liable to water penetration, so leads to fewer faults requiring to be repaired
Mixture of overhead and underground wires throughout the country	No overhead wires in the Major Cities	Overhead wires suffer weather damage more often than underground wires, so again the LRIC network requires less repair and maintenance
Insufficient spare capacity in some areas	Optimised distribution of spare capacity	Spare capacity means that when a customer moves, or for any other reason the service required implies a change in the copper wires used, the capacity is already there, while currently eircom has to send workers to make physical alterations to the network. (Less intervention of this kind is then itself a cause of fewer faults.)

Source: ComReg analysis of eircom data and model

As can be seen, for each difference identified, the LRIC model of the local loop network developed by eircom would have lower operating costs than eircom's current network. Thus eircom's present levels of operating costs are likely to be significantly higher than the costs that should be recognised in a LRIC-based methodology for determining the costs of the local loop network. This would be true even if eircom were operating its existing network with perfect efficiency.

If it is not appropriate to use actual historic operating expenditure then it is appropriate to explore alternatives. ComReg has considered this issue in the manner described in the following section.

5.2 Methods of Estimating Operating Costs for LLU Charges

5.2.1 Adjusting eircom's actual costs

One approach to making adjustments for efficiency, which eircom has proposed, would be to use actual expenditure and adjust for projected efficiency improvements. However this approach would appear to suffer from the flaws described in the previous section.

Another approach might be to invite management consultants or other external parties to review eircom's operations in detail and provide their recommendations on how productivity could be improved and on what the resultant cost savings would be; or to find some other way of assessing eircom's level of efficiency. This would then leave the question of how far the operating costs of an efficient operator of eircom's present network would exceed those required by an operator using the LRIC modelled network.

However, where assessments of efficiency are based on management or management consultants' analyses, these largely comprise judgements. If these judgements were to be challenged, e.g. by an operator that sets out to argue that the claimed efficiencies are illusory, any regulator or court would be in a difficult position considering the rival positions.

ComReg will however be interested to receive comments on the levels of eircom's present levels of costs, and how these might relate to those of an efficient operator of the LRIC model network. This is for several reasons:

- Insofar as the LRIC model network resembles the actual network, and it is possible to form a view of the apparent level of efficiency of particular categories of operating cost, this may be a useful point of comparison with estimates derived from other sources

- In order to reconcile estimates based on alternative sources with those based on actual costs. To complete such a reconciliation exercise would take more time than is available before charges need to be effective from 1 April 2004, but it may be useful for the following year as a way of understanding how far

eircom's present cost levels reflect legacy infrastructure, and how far they might be reduced through more efficient day to day operations.

5.2.2 Bottom up modelling of operating costs

In a local loop, operating costs depend partly on "events" such as faults needing to be repaired, or customers needing new or different connections that in turn depend among other things on the types of assets employed and on the network layout. To estimate operating costs driven by events, two sets of assumptions are needed:

- Operating events (per year) per unit of equipment; and
- Unit costs for each of these events.

The operating costs are those concerned with maintaining the network and providing or rearranging services to customers. Events might be defined to include both routine maintenance and monitoring, and also different kinds of failures and faults, and responding to different kinds of customer request.

The first step in this approach is to identify the major activities that give rise to operating costs. Some aggregation is desirable, but at the same time the operating costs of each identified activity should, as far as possible, be specified to depend on a single cost driver. The cost driver is required to explain the costs of that activity and should be easily quantifiable. The cost driver should be measurable in a way that enables it to be identified with individual products or services.

The next step is to identify the operating costs of each activity, and to ask what resources should that activity consume? If the activity is maintaining cables, the operating costs would include the wages of the engineer, the specialist equipment required by the engineer, transport costs and so on. Some of the costs are shared by more than one activity, in which case the costs should be apportioned.

Such modelling has been undertaken for Denmark.[7] In Professor Melody's final report on IAG2, it was suggested that the Danish experience might give useful pointers for how such modelling might be undertaken for Ireland. In Denmark, such an approach was used to estimate the operating costs for copper cables and network termination points. The events used in the model were 25 events per 1,000 NTPs and 25 per 1,000 copper pairs. The cost per event for copper related events was based on the hourly wage rate of a technician and an assumption that each event took 4 hours to deal with (1.5 hours to organise and travel and 2.5 hours to repair and test).

A "bottom-up" approach to estimating the operating costs of some access assets seemed to work in Denmark. However, not all operating costs were estimated using such an approach. For example, mark-ups were used to estimate other direct operating costs such as those relating to duct or to building. A number of other relevant costs such as indirect operating costs were calculated through a mark-up based on an efficiency- adjusted view of the operator's actual costs.

As a result of this exercise, and including operating costs estimated using a mark up on capital expenditure, the estimate of operating cost per line in the Danish bottom up model amounts to some € 1.7 per month. This estimate excludes an allowance for indirect costs, which were recognised through a mark-up.

The above discussion indicates the complexity of the task of generating a satisfactory bottom-up LRIC model of local loop network operating costs. In view of the length of time such an exercise would take, ComReg does not currently propose to establish an exercise to develop such a model. However, after maximum LLU charges are determined with effect from April, this possibility may be re-examined,.

5.2.3 Benchmarking against other European operators, using aggregate ratio analysis

The telecommunications industry has traditionally used summary ratios, such as operational cost per line or lines per employee, as broad indicators of a company's operational efficiency (before allowing for differences in networks or markets). Data from the accounts of other European operators can be used to make such comparisons.

However, for our present purposes, the data from European operators is currently very limited. Only in Ireland, the UK and Italy have regulatory accounts been published that allow the costs of the access or local loop network to be distinguished from other costs: statutory accounts available elsewhere do not provide this breakdown.

ComReg therefore concludes that simple ratio analysis from EU data cannot at this stage provide a useful guide to the appropriate level of operating costs of the access network. This position may change in time, as operators in more countries publish more detailed regulatory accounts.

5.2.4 Benchmarking against US operators

Fortunately, there is a better data source from outside of Europe that can be used. Automated Reporting Management Information System, (ARMIS) is a database initiated in 1987 by the Federal Communications Commission (FCC), the US Telecommunications Regulator, with the aim of collecting financial and operational data from the largest US carriers.[8] Today, the ARMIS database consists of ten public reports. Within this information system, detailed data on access operating costs are available for all the 31 "Large Size" LECs, providing a valuable set of data for analysis.

The US LECs produce data for asset values on a Gross Book Value (GBV) historical basis, not on the Gross Replacement Cost (GRC) basis required by current cost accounting and LRIC costing. These data from the LECs are however generally considered to be of good quality and are presented in considerable detail, with the

further advantage that the capital and associated operating costs for many individual categories of assets can be matched with those in eircom's regulatory accounts and in the LRIC model network.

ComReg therefore made an assessment of the ratios between different classes of asset and the associated LEC operating costs.

Average ratios between GBV and operating costs were applied to the same categories of assets as valued in the LRIC model, to provide estimates of different categories of operating costs for the Irish local loop. These estimated costs were substantially lower than eircom's current operating costs. As these were at the time the best available estimates, they were used, *inter alia* as the basis for ComReg's Decision Notice D12/03.

However, the use of average ratios depends on historic asset valuations, and takes no account of differences between the circumstances in which different LECs operate, climate, population density, etc. ComReg has therefore been considering ways of taking account of other differences between the networks in a systematic manner.

5.2.5 Econometric modelling using US data

ComReg asked Europe Economics, an economics consultancy, to investigate further how fuller use could be made of the US LECs' data for estimating a feasible level of operating costs for the local loop network in Ireland.

The extent to which it is possible to control for differences in determinants of operating costs depends on the data that is available. For the US LECs, it is possible to obtain data on a number of the variables that might lead to differences in appropriate operating costs from those facing eircom. These series include variables relating to plant, to demographic and to meteorological variables.

The exercise starts by seeking to explain, in statistical terms, the differences between operating costs of different LEC operators and in different years (in technical terms this is a panel data set). Once a model has been developed, it can be used to produce estimates for what the operating costs would be expected to be of other companies not in the original set of companies, provided that data for the explanatory variables are available for those companies.

For a network outside the USA, some currency conversion will then be required, in this case from dollars to euros. Since most of operating costs comprise labour costs, this adjustment should be largely based on a ratio of hourly labour costs in the two countries, using non-wage as well as wage costs and approximating as closely as possible the kinds of labour whose wages comprise operating costs.

The starting point has been to calculate the average operating costs per line in the sample of LECs, distinguishing between the different types of operating cost explained in Section 4. This provides estimates of a level of operating costs that has

in practice been achieved by a large number of operators. The average does not show what costs the more efficient LECs incur, so it may be more relevant to take the average from a sub-set whose costs are lower. Even these figures will reflect the operating costs of companies operating with assets of various ages, without the benefit of the hypothetical new network such as that of the LRIC model whose capital costs eircom would be allowed to recover in LLU charges.

It must also be acknowledged that an explanation can never account for all of the differences in determinants of costs. The crucial advantage of using the LECs for comparative purposes is that it provides a source of evidence on what operating cost other companies have been able to achieve and thus some evidence on what efficiency might mean.

The starting point of the analysis is the average operating cost per line identified in the LEC data. The purpose of the econometric modelling is to establish, on a statistically significant basis, if there are any exogenous factors that can account for the variation in operating costs, other than the number of lines, observed in the data. Clearly when one can identify such factors it will be desirable to allow for these. Therefore, where explanatory factors are identified the average cost per line should be adjusted to account for the influence of the factor or factors. If on the other hand one is unable to identify, in a statistically significant manner, factors that account for the variation then the average cost per line is the most reasonable estimate available from the data. The section below outlines the econometric modelling undertaken on various cost categories. Appendix C gives details of the variables tested and the statistical outcomes of the modelling.

5.2.5.1 Direct network operating costs

This section describes the variables that were used to try to explain differences in direct network operating costs between the US LECs, and in different years.

As might be expected, the most obvious variable and a main determinant of operating costs is the number of lines in the local loop network. The model was estimated using costs per line as the dependent variable, with an additional test then being carried out for economies of scale using the number of lines as an explanatory variable.

Explanatory variables relating to the nature of the network included each operator's average cable length per line, trench length per line, the proportion of cable length strung along poles and the proportion of underground cable length that is put in duct, (as opposed to being simply buried). As a measure of quality, average repair intervals, (times for a repair to be carried out) were also included.

Explanatory variables relating to the demographics of the regions analysed included the proportions of lines in metropolitan areas and the proportion of lines to residential properties. A measure of wage levels was also included.

A number of variables were used to try to capture the effects of different meteorological conditions on local loop direct network operating costs. These included average temperatures in the State served by the LEC, the range of temperatures, the amount of rainfall and the number of freezing days, all of which may affect operating costs.

A time trend was also included in the model to allow both for inflation and for efficiency improvements over time.

The appropriate level of these costs for Ireland will then need to be allocated between services because only part of the cost should properly lie with the local loop network. As US LECS data is not split between access network and other categories ComReg proposes to use the *ratio* of eircom's access network costs to total cost from the eircom Separated Accounts.

The model Europe Economics has constructed for direct network operating costs is a random-effects panel data model. This modelling approach allows the estimated parameters to be applied to out-of-sample data. This analysis represents the most thorough attempt ComReg is aware of to capture as many as possible of the influences on direct network operating costs that vary between networks.

A technical document, with an explanation of the approach and the reasoning behind choosing it in preference to other methods is included in Appendix C of this paper.

5.2.5.2 Direct non-network operating costs

As explained in Section 4, direct non-network operating costs mainly comprise the operating costs of land, buildings and of general purpose computers, as well as the costs of testing, engineering and network administration.

With regard to the direct non-network operating costs associated with land and buildings, ComReg has some insight into the costs involved in LLU from the co-location costing model developed by ComReg in 2002. During ComReg's review of this particular cost contained within the eircom LLU product pricing submission, it will be aware of the various costs produced using the LLU co-location costing model in order to ensure consistency between the two models. ComReg will also take into account other evidence from the Irish buildings market which may be publicly available from time to time.

In the same way as for direct network operating costs, ComReg has explored the use of estimates based on LEC data for the categories of direct non-network operating costs concerned with general purpose computers, testing, engineering and network administration. However, it has not yet proved possible to develop satisfactory econometric models to explain differences between LECs with regard to these particular costs. One approach to these categories of direct non-network operating costs would be to use the average cost per line of the more efficient LECs.

ComReg acknowledges that using an average of LEC costs per line does not develop any understanding of the determinants of differences other than the number of lines between networks in these costs that might help to understand influences on the costs likely to be involved in operating the LRIC network for Ireland. Nevertheless, analysis of data from this sample of operators can still provide a useful starting point.

Again as US LECS data is not split between access network and other categories ComReg proposes to use the *ratio* of eircom's access network costs to total cost from the eircom Separated Accounts.

5.2.5.3 Indirect operating costs

As was described in Section 4, indirect operating costs contrast with direct operating costs in so far as they are incurred to run the business of a telecommunications operator as a whole and not just the access or local loop 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. It has not proved possible to develop satisfactory econometric models to explain differences between LECs in the levels of indirect operating costs with regard to network variables, however this is hardly surprising given these particular costs have little in common with the design of a telecommunications network.

Again, the proposed approach with regard to the review of the eircom LLU pricing submission to these categories of indirect operating costs would be to use the average cost per line of the LECs, or a sub-set of efficient LECs. The appropriate level of these costs for Ireland will then need to be allocated between services; only part of the cost should properly lie with the local loop network.

Again as US LECS data is not split between access network and other categories ComReg proposes to use the *ratio* of eircom's access network costs to total cost from the eircom Separated Accounts.

5.3 Conclusions on operating costs

ComReg considers that statistical or econometric studies of operating costs per line achieved by US LECs that adjust as far as possible for differences in the factors that determine costs can provide useful information on the appropriate level of operating costs for the unbundled local loop network in Ireland, as they show a level of operating costs per line that have been found practical by a number of companies. Those LECs whose costs are low indicate feasible levels of efficiency, using mixed-vintage assets.

Judgement will be required in applying the estimates, in particular in considering whether there are sound and demonstrable reasons why the level of operating costs in Ireland should differ from those in the LECs; if so, these can be taken into account in determining the appropriate charge.

ComReg also recognises the potential value of having a detailed bottom-up model of operating costs that would be incurred by an efficient operator of the LRIC model network; and of reconciling cost estimates derived in this way with the actual costs of the incumbent. However, such analyses would be time-consuming and involve difficult judgements.

ComReg therefore proposes to base its approach in the review of eircom's pricing submission for LLU and therefore in the setting of a maximum level of LLU charges from April on the econometric and statistical analysis described in this Consultation Paper, while also taking into account relevant information from all other available sources. Using eircom's actual costs would provide no information on efficiency, and would not be consistent with allowing eircom to charge the capital costs that would be required to remunerate an efficient new investor as modelled in the LRIC methodology.

ComReg's proposed approach is summarised in Table 6.2

Table 6.2: Summary of Treatment of Cost Types

Operating Cost Category	Appropriate Treatment
Direct Access Network Operating Costs	Econometric model of LEC data
Direct Non-network Operating Costs	
Of which testing, engineering and plant operations admin. expenses	Average cost per line of LECs
Of which land and buildings	Comparison with LLU co-location model
Of which general purpose computers and other assets	Average cost per line of LECs
Indirect operating costs	Average cost per line of LECs

5.4 Questions / Issues for Consultation

Q. 2. Do you believe that eircom's actual operating costs of its local loop network cannot be used alongside the capital costs on a new network, as estimated under the LRIC approach? Please provide detailed reasons for your views.

Q. 3. Are there grounds for believing that any of the operating costs forming part of an efficient entrant's LRIC local loop network would be higher than eircom's actual operating costs? If so, what might they be?

Q. 4. Does the above discussion explain fairly the strengths and limitations of the different ways of estimating efficient operating costs for the LRIC unbundled local loop network? If not, in what ways is it incomplete or deficient? Please provide detailed reasoning.

Q. 5. Do you agree that it is appropriate for ComReg to use evidence from US data in determining the efficient level of operating costs for the local loop network in Ireland? If not, please indicate what you think would be a superior approach and why.

Q. 6. Do you agree that the explanatory model for differences in LECs' direct network operating costs set out in Appendix C has been selected using appropriate criteria and that it captures the important influences from plant, demographic and meteorological variables in a satisfactory way? If not, how should the modelling strategy be improved?

Q. 7. Do you agree with the allocation criteria set out above for allocating a portion of direct non-network and indirect costs to the unbundled local loop should be based on eircom's Separated Accounts? If not, please indicate what you think would be a superior approach and why.

6 Submitting Comments

All comments are welcome, however it would make the task of analysing responses easier if comments were referenced to the relevant question numbers from this document.

The consultation period will run from 27th February 2004 to 26th March 2004 during which the Commission welcomes written comments on any of the issues raised in this paper.

Having analysed and considered the comments received, ComReg will publish a report on the consultation which will, *inter alia,* summarise the responses to the consultation.

In order to promote further openness and transparency, ComReg will publish the names of all respondents and make available for inspection responses to the consultation at its Offices.

Please note ComReg will publish all submissions with the Response to Consultation, subject to confidentiality. ComReg appreciates that many of the issues raised in this paper may require respondents to provide confidential information if their comments are to be meaningful. Respondents are requested to clearly identify confidential material and if possible to include it in a separate annex to the response. Such information will be treated as strictly confidential.

Appendix A – Glossary of Terms

Note: Terms with their own entries in this glossary are shown in italics when they appear in other entries.

Access Directive: Directive 2202/19/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. This provides the basis for regulation of access in EU member states, which were required to apply the new measures from 25 July 2003. Previous directives were repealed, and member states were required to maintain obligations for undertakings until the relevant markets had been reviewed under the new procedures.

Access Network: 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 operators local exchange, concentrator or equivalent facility". The access network is wider than local loops and includes line cards, which connect customers to the core network, (these will be provided by new entrants themselves when they purchase unbundled local loops from the incumbent), as well as other access technologies such as fibre and wireless.

Bottom-up model: A model using engineering analysis and judgements on the assets and operating costs required to provide a set of services, on the basis of the demand characteristics of the country in question.

Common Costs: The costs of those inputs necessary to produce two or more services, where it is not possible to identify the extent to which a specific increment causes the cost. For example, some trenching will be used by both the access and the core network. So will vehicles and IT equipment. In these instances, the costs will be common costs between these two networks.

Cost Driver: The factor that causes a cost to be incurred; the determinant of the cost. For example, the number of subscribers is a determinant or driver of the cost of line cards.

Current costs of assets: The cost of replacing today a set of assets. See also *gross replacement cost* and *modern equivalent assets*.

Direct operating costs: Direct operating costs are so called because they are directly associated with the operation of particular types of asset. The assets required to provide a local loop service are categorised as Network Assets, and Non- Network assets.

Digital subscriber loops: A range of modern technologies allowing high bandwidth services to be provided along copper loops; hence suitable, for example, for

broadband Internet use. One example is Asymmetric Digital Subscriber Line (ADSL): a technology that provides high-speed data on an asymmetric basis. With ADSL, typically a copper line is used to send a large quantity of data, (e.g. a television picture) in one direction and a small quantity, (e.g. a control channel and a telephone call) in the other. Currently used for speeds of up to 2 Mb/s.

Direct non-network operating costs: The costs of maintaining assets that are required to maintain and support the operation of the network assets needed for the provision of the local loop services. The extent of non-network assets in use is determined by the extent and nature of the network assets. Unlike the use of network assets, the use of non-network assets is not directly determined by underlying demand cost drivers such as the number of lines or the extent of calls. Many of these non-network assets are also useful for the provision of other wholesale products, e.g. interconnection services.

This distinction is important because direct network operating costs can almost entirely be attributed to the *access network* and, therefore, to the *LLU* products, whereas non-network direct operating costs are incurred not only for the provision of loop connections but also for the provision of other wholesale products, e.g. interconnection services. Examples include buildings, vehicles and general purpose computers.

Duct: piping, (usually plastic) containing underground cable. Some underground cable is ducted; some is not. Some ducted cable is pressurised, to prevent water penetration, while some is not.

Efficient entrant: In an *LRIC* model, the relevant operating and capital costs are those of a hypothetical efficient entrant building a new network, rather than the costs of the historical network.

Historic costs of assets: See *Gross book value.*

Gross replacement cost (of assets): The cost of replacing today a set of assets, before allowing for any depreciation in the value of those assets, (Net replacement cost would be after allowing for depreciation). This is a current cost accounting concept. It needs to be specified whether the replacements are to be identical to the original assets or whether they are to be *modern equivalent assets*.

Gross book value (of assets): The value of assets shown in a company's accounts, before allowing for depreciation. A *historic costs* notion with gross book value based on the original purchase price of the assets.

Increment: The set of services to be costed in a *LRIC* exercise. For this Consultation Paper, all services using the *local loop network.*

Indirect costs: These refer to costs indirectly associated with the provision of the service. They 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.

Line cards: The pieces of electronic equipment that connect customers to the core network and manage the individual lines. In simple terms, the individual customer's line plugs are inserted into the line card, and the line card is then itself inserted into a port and a switch to connect that individual customer to the main network.

Long Run: The length of time over which all inputs are variable and hence all costs are avoidable. In the long run analytical horizon, an entrant could build an entirely new network.

Long run incremental costs (LRIC): The costs of providing all the services in a particular *increment* in the long run. What the costs would be for a hypothetical *efficient entrant* building a new network using modern equivalent assets to provide the services in the most efficient way.

LECs: US Local Exchange Carriers; companies that provide *network* services to US customers. Detailed data are publicly available on 31 large LECs under the automated Reporting Management Information System, (ARMIS), a database initiated in 1987 by the Federal Communications Commission.

Local loop network: "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". [See *Access network* for source and for relation between the access network and local loop network.]

Local loop unbundling (LLU): The process whereby the incumbent operator makes its *local loop network,* (the connection between the customer's premises and the local exchange) available to other companies. The customer is then able to choose another supplier other than the incumbent to provide service. The unbundling of the local loop may take a number of forms, with the two most common being full unbundling, or physical access, and bitstream access.

Modern equivalent assets: The most efficient equipment now available, using currently proven technology, to provide the relevant services. This principle provides the basis of determining what assets should comprise a *LRIC* network.

Appendix B — Consultation Questions

List of Questions