

Estimation of the Net Cost of fulfilling Universal Service Obligations in the Telecoms sector

Under the European Union Universal Service Directive (2002/22/EC), in cases where it is demonstrated that universal service obligations (USO) can only be provided at a loss or at a net cost, and that such costs represent an unfair burden, Member States are obliged to consider claims for net costs of the USO and, where necessary, establish financing mechanisms administered by national regulatory authorities (NRAs).

eircom, the designated Universal Service Provider (USP) in the Republic of Ireland, engaged London Economics (LE) to prepare an independent and rigorous estimate of the net cost to eircom of fulfilling its USO, with the purpose of supporting a claim for compensation to ComReg, the Irish NRA.

This Economic Brief describes LE's estimation of the net cost of the USO to eircom. The study was the first to comprehensively estimate the net cost of complying with the USO in the Republic of Ireland. This brief presents a discussion of the approach, methodology and modelling employed in this exercise.

USO and potential for a net cost

A USO is a set of requirements imposed on a service provider, typically the largest provider in the region, and is designed to ensure that all persons in that region have access to some minimum set of services (in this case, telephony services) at an affordable price.

There exist both social and economic rationales motivating the imposition of a USO.¹ The primary social rationale for having a USO is based on equity and ensuring social participation by making a basic package of telephone services affordable for all subscribers, including disadvantaged groups. An economic rationale for having a USO relates to network externalities. As the full benefit of an individual subscriber joining the network is not appreciated or considered by the individual (a positive externality), there is a justification for the government intervening to correct this market failure, in order to encourage an optimal level of subscription.

Before the advent of liberalisation in the telecoms sector and the introduction of competition, the USO was funded via cross-subsidy; high prices on services such as long distance calls cross-subsidised access and local calls. To ensure the viability of the USO, incumbents were given legal protection from entry. With liberalisation, it is possible that the USO will become unsustainable in the face of entry and possible cream-skimming or cherry-picking strategies (entry in high-revenue/low-cost areas only).

As most segments of telephony markets in most developed economies are now deregulated and incumbent providers either privatised or not having other means of subsidy available, the issue of USO net costs and associated funding is now a significant consideration for USP, other providers and NRAs alike.

Review of guidance and international best practice on USO costing

Based on our legislative and international best practice review, we identified several key desirable features for a USO costing model:

- It should be based on forward-looking long-run incremental costs², including a normal return on capital;

¹ For a discussion of the rationale for USOs, please see: http://www.ofcom.org.uk/consult/condocs/telecoms_review1/telecoms_review/annexg/

² Long run incremental cost (LRIC) may be defined as the extra cost that would be incurred in the long run by the addition of the defined increment of output, given that existing output is already produced. Considering this definition in reverse, LRIC costs may be viewed as the costs that would be avoided by not producing that increment of output.

- Both uneconomic services and customers or groups of customers should be included, but double-counting should be avoided;
- Only costs of elements required under the USO should be included in the estimates, not requirements imposed on all operators or costs relating to normal network extensions and replacement activities;
- Assessment of revenue for use in the net cost calculation should include direct revenues, indirect revenues (e.g. incoming calls) and an allowance for replacement calls;
- The gross cost of the USO should be offset by the value of a range of intangible benefits associated with being the USP.

General approach and principles

In keeping with international best practice, we adopted the avoidable cost approach to measuring the net cost of USO, rather than the alternative of a cost-reflective approach. This approach aims to identify the net costs that would be *avoided* if an operator chose not to serve an area/subscriber/service element on the grounds that it was unprofitable from an economic point-of-view.

Our approach and methodology is developed based on the following guiding principles:

- To independently develop rigorous estimates of the net cost of USO. In a number of areas, where there was uncertainty, we have in these cases taken a prudent approach to the cost estimation;
- Estimates should be based on best possible information, but not require significant new data gathering exercises;
- The modelling should be consistent with economic principles, legislative and regulatory guidance, as well as international best practice;
- To ensure robustness and accountability of the model, total revenues, costs, lines, calls, minutes, etc. in the model have been controlled to match the relevant published regulatory account totals. The LRIC unit costs employed were also obtained from the regulatory accounts.

Methodology and modelling

LE designed and built an iterative net cost model based on forward-looking long-run incremental costs to estimate the net costs of USO.

The model estimates the net cost of USO as the sum of the net cost arising from three levels of analysis. For the purposes of the analysis, *(un)economic* is defined as being (un)profitable from an economic point-of-view.

Schematic Overview of USO Costing Model

+	Net cost of USO for Uneconomic Exchange Site areas	(A)
+	Net cost of USO for Uneconomic Customers in Economic Exchange Site areas	(B)
+	Net cost of USO for Uneconomic Payphones	(C)
<hr/>		
=	TOTAL NET COST OF USO	
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To summarise, the model first estimates the net cost arising from areas that are uneconomic in their entirety. Next, focusing on only economic areas (to avoid double counting), all lines in economic areas are ordered into percentiles based on line length, enabling the estimation of the net cost arising from uneconomic lines at economic exchanges. Thirdly, the model estimates the net cost incurred from uneconomic service elements (payphones). Finally, all three elements are summed to yield the total net cost of fulfilling the USO.

Uneconomic Areas (A) and Uneconomic Customers in Economic Areas (B)

The structure of the model to estimate the net cost of USO deriving from uneconomic areas (groups of subscribers) and uneconomic subscribers in economic areas is the same and so we discuss them together here.

As is clear from the list of model components, we take a holistic, network-wide view of the full range of costs and revenues attributable to a particular area/subscriber in order to determine whether it is uneconomic or not.

For each exchange area and each line distance percentile, we estimate the net cost of USO as the sum of the following components:

Model to estimate the net cost of USO arising from each Exchange Site Area / Subscriber Line Distance Percentile
<p>Costs</p> <ul style="list-style-type: none"> + LRIC Access Cost, estimated average cost per line times the relevant number of lines + LRIC Core Network Cost, LRIC costs per call/minute times the relevant numbers of calls/minutes, for each call type <p>Revenues</p> <ul style="list-style-type: none"> - Retail revenue from Access, Outgoing Calls and Supplementary Services - Net revenue from Incoming Calls + Net revenue from Replacement Calls - Net revenue from Wholesale Services - Net revenue from Complementary Services (incl. Leased Lines and DSL) <p>Intangible Benefits</p> <ul style="list-style-type: none"> - Annualised value of Ubiquity, Life Cycle and Brand Enhancement Benefits <p>= Net Cost (Return) for Exchange Site / Subscriber Line Percentile</p>

Uneconomic Payphones (C)

In terms of potentially uneconomic service elements, our research focused on payphones, calculated as the sum of the following:

Model to estimate the net cost of USO arising from each Payphone
<p>Costs</p> <ul style="list-style-type: none"> + LRIC Access Cost, estimated average cost per line at the local exchange site + LRIC Core Network Cost, LRIC costs per call/minute times the relevant numbers of calls/minutes, for each call type + Payphone-specific Costs (maintenance, cleaning, coin collection, etc.) <p>Revenue</p> <ul style="list-style-type: none"> - Revenue from Outgoing Calls <p>Intangible Benefits</p> <ul style="list-style-type: none"> - Annualised value of Kiosk Advertising <p>= Net Cost (Return) for Payphone</p>

Intangible USO Benefits

We define and estimate the following benefits associated with USO in our modelling, which

are then deducted from the cost of USO estimated for the main network:

- Ubiquity (universal coverage);
- Life cycle benefits (relating to customer lifetime value);
- Enhanced brand recognition; and
- Marketing benefit of access to telephone usage data.

Discussion of Selected Methodological Issues

Access Unit Costs

Access costs are a significant component of the total cost of USO provision and so deserve particular attention. The access cost of providing each individual line is unobserved, so this is estimated, using regression analysis.

At the exchange level, the model is based on the thesis that the line density of the exchange is the primary explanatory variable for variation in the cost of access for individual lines. For geographic classifications of exchange sites based on line density (g), the relationship between access cost (AC_g) and average exchange site line density (D_g) is estimated, at each available time t :

$$AC_{g,t} = f(D_{g,t}) + u_{g,t}$$

This relationship was empirically estimated using panel econometric techniques and then evaluated for each exchange site, using calculated line densities per exchange site. This yields an estimated average access cost per line for each exchange site.

In the subscriber level model, the central tenet of our analysis is that geographical distance from the local exchange (as a proxy for line length) is the primary explanatory variable for variation in the cost of access for individual lines. Again for geographic classifications of exchange sites (g), the relationship between access cost (AC_g) and average line length (L_g) is estimated using panel econometrics, at each available time t :

$$AC_{g,t} = h(L_{g,t}) + e_{g,t}$$

The equation is then evaluated for each line length percentile, yielding an estimated average access cost per line for each line length percentile.

Incoming Calls

Telephony information systems generally record outgoing calls rather than incoming calls, meaning that the level of incoming calls must be estimated. We estimated the level of incoming calls based on an assumption of

symmetry with observed outgoing call patterns, adjusted by the ratio of call origination to call termination volumes.

An essential consideration is that the level of incoming calls to any given line/exchange area is a function of the number of areas and lines in the network. This is simultaneously determined as some areas and lines are found to be uneconomic, and would be disconnected, with the loss of their calls to other areas and lines. In summary, incoming call totals are both a cause and an effect of the aggregate extent of uneconomic areas and lines. So, to avoid double-counting incoming calls originating within uneconomic areas (as opposed to those that originate in an economic area and terminate in an uneconomic one), we adjust the estimated number of incoming calls down to take account of the extent of uneconomic areas/lines. We make this adjustment through an iterative process that allows the economic area/line determination to be made simultaneously with the extent of incoming calls for any given area/percentile.

Replacement Calls

The concept of replacement calls is based on the logic that should a customer have been disconnected, it is likely that he/she would still have made some proportion of their calls over the fixed line network, 'replacing' them by making calls through payphones or the lines of neighbours, friends or family.

The levels of replacement calls were estimated based on the rate of expected replacement calls predicted in a study by Oftel in 1997.³ Given significant developments since this date, we amend these parameters by a consideration for mobile call substitution, using a call volume composition analysis to predict the probability of a replacement call being made on the fixed line network rather than mobile. Then, the likelihood of the USP regaining this call net revenue is applied, based on market share.

Brand enhancement benefit

USPs are believed to benefit from brand and reputation enhancement deriving from being known as the USP and serving uneconomic areas and customers. However, measuring brand value presents some inherent challenges. To surmount these challenges, it is often useful to consider more than one

approach. For eircom, we used an asset-based approach, as eircom recently rebranded. The alternative to the asset-based approach is to measure the brand value on a current income basis, where the value of the brand is the annual value of additional net income that accrues to the incumbent from being the USP.

Once the value of the USP's brand is established, the incremental proportion of the brand value attributable to the designation of the firm as the USP is estimated. Since a lower own price elasticity of demand is one of the major benefits inherent to brand value, we focused on estimating its value. In order to do this, we adopted a survey-based approach to estimate the impact of the USO on consumers' propensity to use eircom for USO and non-USO products/services, adjusted to avoid double-counting between them.

Unfair burden

The EC Directive specifically requires that the net cost of USO must be considered an *unfair burden* on the USP in order for a USO fund to be merited. However, it does not provide a definition of 'unfair burden' or guidance on making this assessment. Consequently, national legislators across the Member States have adopted a range of approaches, such as:

- A specific definition of 'unfair burden';
- Any proven net cost is assumed to represent an unfair burden; and
- No definition provided (as in Ireland).

Net Cost of USO Estimates

The most recent estimates of the net cost of USO published for France, Spain and Italy, three of the biggest economies in Europe are as follows:⁴

- **France:** €33.3 million (2004);
- **Spain:** €80.1 million (2005); €83.8 million (2004); €120.3 million (2003);
- **Italy:** €41.0 million (2003); €37.2 million (2002).

With eircom's claim to ComReg ongoing, the estimates of eircom's net cost of USO are still confidential. However, we can state that the estimates are in the range expected for a country with the size and population dispersal of Ireland.

³ Oftel (1997) *Universal Telecommunications Services: Proposed Arrangements for Universal Service in the UK from 1997*, (now Ofcom).

⁴ Cullen International (2007) "Big Five Update"; EC COCOM (2007) "Universal Service Implementation Issues – results and analysis of replies from Member States on universal service financing".