

**CALL ORIGINATION AND TERMINATION
CHARGES FOR ACCESSING THE INTERNET**

By Martin Cave* and Peter Crowther**

1 October 1999

This Paper was prepared at the request of AOL Europe.

The conclusions drawn herein are entirely independent and should not be taken to represent the views of AOL Europe.

Whilst every effort has been made to ensure the accuracy of the information contained in this document, no liability can be accepted for reliance on this or any part thereof.

* Professor of Economics and Vice Principal, Brunel University

** Consultant, Rosenblatt Solicitors

Executive Summary

This paper examines the economic issues underlying the present structures of charges for calls to the Internet from the point of view of both the telecommunications regulatory system and the competition rules. The authors believe that challenging some of the assumptions underlying the current regulatory structure will allow regulators to take steps within the current regulatory framework which can lead to increased competition and consumer choice on the retail Internet market. This will in turn lead to lower prices for consumers and growth in penetration and use of the Internet.

The paper considers the three main criteria against which the current charging regimes can be considered:

- Does the present regime ensure optimal network usage ?
- Does the present regime send appropriate signals to the market to ensure that efficient alternative infrastructure investment is made ? and
- Does the present regime ensure demand led growth in the retail markets of call services and Internet service provision ?

The paper concludes that there are sound economic arguments in favour of changes to the current regulatory system of Internet call charges.

In relation to call origination:

- Because of call set-up costs, if call origination is priced exclusively on a per minute basis, then there will be a systematic tendency for longer calls to be over-charged (in relation to the costs) than shorter calls;
- Because much residential access to the Internet occurs at off-peak times, the question of the balance between peak and off-peak rates acquires new significance. It is likely that the current relationship between the rates in many member states fails adequately to reflect low off-peak costs;
- If incremental costs are computed over the increment of Internet access rather than call origination as a whole, they are likely to be reduced, possibly by a significant amount. This alternative form of calculation is appropriate whenever there is a lower cost alternative method of dealing with Internet traffic, such as moving the calls from the switched to a data network.
- Finally, to the extent price elasticities of demand are higher for Internet access than for voice telephony, it is efficient to recover more (proportionately) of common costs from the latter than the former.

In relation to competition law in particular, to the extent than a dominant PSTN operator possesses market power in call origination, such an operator will have little incentive proactively to introduce efficient tariffs. This is likely to lead to problems of:

- Excessive pricing, in that the charges made for the service do not reflect the underlying costs of provision;
- Discrimination, in that an operator charges equivalent amounts for voice and Internet transactions, despite their different supply and demand characteristics; and
- In respect of both of the above, limits on the growth and development of the retail Internet market, thus hampering production, markets and technical development.

In addition, in relation to call termination:

- Because of the different supply and demand characteristics of Internet call termination as compared to voice call termination, regulating the terminating operators may be inappropriate and therefore may lead to inefficient investment signals.

The paper concludes that consideration should be given to the adoption of new tariff options for call origination and termination which are more appropriate for Internet traffic. This could include one or more of the following changes to the current system:

- The adoption of two-part wholesale tariffs (call setup and per minute charges);
- Steeper peak/off-peak tariff gradients which better reflect relative costs;
- Differentiation of wholesale tariffs to reflect differences in demand characteristics for retail services. When special Internet call rates exist at the retail level, on competition grounds these should also be reflected in wholesale prices charged by the dominant operator;
- The exploration of the possibilities of unmeasured service at a flat rate. Again, when these are made available at retail by the dominant operator, an equivalent tariff should be available at the wholesale level.
- Where the call termination market to ISPs is competitive, allowing terminating operators to set termination rates and relevant retail call prices.

1. Introduction

- 1.1 There has been, and continues to be, a dramatic increase in the number of telephone subscribers using the public switched telephone network ("PSTN") to access the Internet. In Europe, the retail price for this service has typically been identical to the price of a local voice call. More recently however some operators and regulators (for example in France, and Ireland) have taken the view that a different retail charging structure is appropriate for calls to the Internet.
- 1.2 There appears as yet to be no consistent view as to the appropriate charging structure across Europe in respect of calls to the Internet. Looking at the present situation in Europe, there are several different pricing structures in place.
 - In many countries, Internet and voice calls are treated the same at both the retail and wholesale levels;
 - In some countries, for example France and Ireland, a reduced retail tariff for calls to the Internet has been introduced. This is not necessarily reflected in any changes to the wholesale tariff structure;
 - In at least one country, Germany, there are indications that the PSTN operator charges a higher wholesale rate for Internet calls compared to voice calls.
- 1.3 This uncertainty contrasts markedly with the broad agreement reached in Europe on other pricing issues in telecommunications, most notably the appropriate costing and charging structure for voice call termination.
- 1.4 This paper considers the economics and welfare effects of the wholesale and retail charging regimes in the context of the increasing number of calls to the Internet. It takes as its basic case, the use by a residential customer of a domestic telephone line to connect to an Internet Service Provider (ISP) and thence to the Internet. The call to the ISP therefore originates over the network of the PSTN operator. This is referred to as call origination. The PSTN network may be connected to the ISP via an alternative network operator or by the PSTN operator itself. This is referred to as call termination.
- 1.5 In relation to call origination, the assumptions underlying the basis on which network costs are estimated and averaged – which lead to the prices set - for the purposes of voice telephony, are not necessarily appropriate in the context of access to the Internet.
- 1.6 In relation to call termination, it is often assumed that this is a market characterised by bottleneck control by the terminating operator over its connected customers. Whilst this may be the case for voice calls, it is demonstrably not the case for calls bound to ISPs.
- 1.7 Our analysis suggests that it is these assumptions that require reconsideration in the context of Internet access, and not, as yet, the underlying regulatory system itself.

- 1.8 The authors believe that challenging some of the assumptions underlying the current regulatory structure will allow regulators to take steps within the current regulatory framework which can lead to increased competition on the retail Internet market, lower prices for consumers, and consequently growth in penetration and use of the Internet.

Economic Efficiency

- 1.9 There are three main criteria against which the current charging regime can be considered:
- Does the present regime ensure optimal network usage ?
 - Does the present regime send appropriate signals to the market to ensure that efficient alternative infrastructure investment is made ? and
 - Does the present regime ensure demand led growth in the retail services markets of call services and Internet service provision ?
- 1.10 These criteria underpin both the current telecommunications regulatory and competition law regimes: the principle of cost-orientation can be seen as the regulatory embodiment of these criteria. As will be shown below, the current assumptions underlying the charging regime have led to a situation where calls to the Internet are often charged on a basis which arguably fulfils none of the above criteria.
- 1.11 In addition, under the competition rules, the prohibition on excessive pricing is designed to prevent the recoupment of monopoly profits in markets segments where the structure of competition is weakened such that competitive constraints on pricing are insufficient. Our analysis shows that there are also grounds for finding the current charges in relation to Internet calls to be excessive, in that the charges do not reflect the true costs. Finally, it can also be argued that the charges are discriminatory, in that transactions with different underlying costs are charged at the same (often per minute) rate. It should be noted that our conclusions do not depend on whether calls to the Internet occupy a separate product market to voice calls. Market definition is discussed further below.
- 1.12 There are a number of options which can be used within existing European telecommunications regulatory and competition law frameworks, to achieve a wholesale and retail charging basis which reflects more closely the true costs and demand characteristics associated with accessing the Internet.

Competitive Constraints

- 1.13 It is necessary to emphasise just two key features of the supply chain which suggest that the present structure of the market does not encourage the unilateral adoption by PSTN operators of economically efficient charging structures.

- 1.14 First, residential telephone subscribers, in the vast majority of cases, access the Internet through the local loops of the PSTNs¹. The importance of this lies in the fact that while access to the Internet is a “new” service, it does not represent a competitive threat to the PSTN operator. Consequently, the PSTN operator will not necessarily have the proper competition-driven incentives to recognise that any differences in the nature of calls to the Internet versus standard voice calls should result in each type of call being treated differently. This will particularly be the case where, as is still often the case in the EU, the PSTN operator charges the same retail and wholesale rate for originating both types of call.
- 1.15 In economic terms this can hamper efficient use of the network. As far as the PSTN operator is concerned, calls to the Internet are an opportunity to earn extra revenue (since a call to the Internet tends to be incremental in the sense that it is in addition to, rather than a substitute for, a voice call). This is subject to the qualification that the use of the network does not increase to such an extent that additional capacity is required. However, we argue below that the installation of further capacity is not necessarily required. This is in part due to the calling patterns which are emerging in relation to voice and Internet calls, with Internet calls typically being made in off-peak periods. Moreover, we argue below that even if Internet usage were to affect peak network usage, it is quite possible that a commercially rational operator, rather than adding additional capacity to the PSTN network to handle data calls, would alter the network so as to take the data off the switch and onto a data network as soon as commercially and technically feasible. This has implications for the most appropriate way to approach the costing analysis, which we note below.
- 1.16 The second key feature is the growing development of ISPs which are subsidiaries of the dominant telecoms operator (tied ISPs). The implication of this is that, even absent any specific or demonstrable anti-competitive intent, a quasi-monopolistic PSTN operator will have a natural economic preference for self supply, which can give rise to many instances of “minor” discrimination. Such instances, while taken individually may not amount to an abusive practice, their collective effect may be to place independent ISPs at a competitive disadvantage. The imposition of accounting separation, however effective, cannot overcome the incentive problem.

Conclusions

- 1.17 We consider there exist strong efficiency arguments supporting our view that a “flatter” charging regime (i.e. a regime under which the costs of access are not so heavily usage-driven) at the wholesale and retail levels may result in overall welfare gains.
- 1.18 Furthermore, there is the potential to create a virtuous circle of network usage, in that a lowering of the costs of Internet access appears likely to increase both the number of users connecting to the Internet and the average length of time which they spend online.

¹ In almost all EU countries, the historic monopolist continues to dominate the provision of call origination facilities.

Increasing the size of the market in this way would lead to lower average costs for the network operator, to the benefit of all of the operator's customers.

Organisation of the Paper

- 1.19 Section 2 provides some brief details concerning the supply chain in relation to calls to the Internet, and, to focus the analysis, a discussion of what constitutes the relevant markets, as a pre cursor to examining the competitiveness or otherwise of particular charging regimes.
- 1.20 Section 3 outlines the costing techniques appropriate in relation to call origination on telecommunications networks, and investigates what are the principal cost drivers. This forms the basis for section 4.
- 1.21 Section 4 examines how the nature of the demand for the different services of voice and internet call origination may – from an economic efficiency perspective – require different approaches to charging.
- 1.22 Section 5 examines issues in relation to call termination for internet access and demonstrates how the issues may well be different than those relevant to termination of voice calls.
- 1.23 Section 6 sets out the conclusions of the paper.
- 1.24 Section 7 reviews the options available to solve the issues identified in this paper.

2. Market Definition

- 2.1 In strict economic terms, market definition is required since without it there can be no fully reliable test of the *market power* which a firm or group of firms possesses. Consequently, market definition is employed as a means of providing an initial analytical framework for an analysis of particular commercial practices. However, arriving at a “correct” market definition is a notoriously complex process, and this is particularly true in the case of network industries.

Theoretical Framework

- 2.2 The market definition process sometimes begins by identifying the narrowest possible range of goods or services, usually those which are the subject of interest. This “market” is then successively broadened to include further services, to the point at which it can be said that this array of services is the minimum array of services which a hypothetical monopolist would have to supply, in order to raise prices significantly for a sustained period of time, without loss of demand. The principle is however difficult to apply in the context of network industries, due to the possibility of providing multiple services over a single network.
- 2.3 Arriving at a ‘sensible’ definition of the relevant market is particularly complex where the same input (the network) is used to produce two or more separate outputs (for ex-

ample, call origination services for alternative telecoms operators, and retail services, including both voice and Internet calls). Clearly, the wholesale and retail services are inextricably related, in that the wholesale service is a component of the retail.

Wholesale Market

- 2.4 In our view, the most appropriate way to approach the task is as follows: at the *wholesale* level, the PSTN operator is equivalently selling originating capacity to retail service providers. The retail service provider may be the retail arm of the PSTN operator, or a third party seeking to use the PSTN operator's call origination service to provide its own retail services. A PSTN operator seeking to maximise profits in a competitive market would therefore devise wholesale pricing regimes which would lead to high levels of use of the network². In this respect, the market may be defined as the market for the sale (in various forms) of wholesale originating capacity. However, a further refinement to this must be added, which is that, based on the type of throughput (i.e. the use to which the capacity is being put) an economically efficient PSTN operator may decide to build a separate data network to handle data capacity.
- 2.5 For call termination to ISPs, terminating network operators are similarly selling capacity to retail service providers. This competition has often manifested itself in rising out-payments to ISPs.

Retail Market

- 2.6 At the *retail* level, the PSTN operator has traditionally sold 'minutes', as a way of recovering the costs associated with installing sufficient capacity to meet demand. Retail prices are inevitably constrained by the wholesale charging structure and it is here that the link between the two markets is inextricable.
- 2.7 However, since a call to the Internet is generally not substitutable for a voice call (empirical support for this is given in section 5 below), the question is whether the two retail services should be charged for on an identical basis, both at the retail and wholesale levels. It is important to reiterate here the absence of incentives on the part of a dominant PSTN operator to devise appropriate charging regimes, since it will, in any event, capture all wholesale and retail revenue.

Relationship between Wholesale and Retail Markets

- 2.8 Taking this approach leads to the following important conclusion: to the extent that the nature of demand at the retail level differs as between calls to the Internet and voice calls, an economically efficient operator would 'feed back' this demand into its wholesale charging regime. An economically efficient operator faced with low marginal costs would seek to extend network usage.

² This would apply in a similar way if it were price capped.

**Characteristics of Internet and Voice Calls
(at both the Wholesale and Retail Levels)**

- 2.9 It appears arguable that the markets for origination and termination of Internet calls are distinct from those markets for voice calls. In the voice environment, the consumer demand is for the call itself; in the Internet environment, there is no demand for the call separate from the demand for Internet connectivity. The effects of this can be seen in particular on the termination market. In the voice environment, termination costs are usually not taken into account by end-users in their choice of service provider. The contrary is the case in the Internet environment where termination rates are typically very important to ISPs.
- 2.10 At the retail level, there are indications that separate markets exist for voice and Internet calls. One crucial feature of Internet calls that separates them from conventional voice calls is their length, another is the fact that retail demand for Internet calls (i.e. the link between the end-user and the ISP) does not exist independently of the demand for Internet connectivity (i.e. the link between the ISP and the Internet itself). Because this reflects a major difference in characteristics and purposes between the two call types, it may be enough to imply the existence of separate markets. This reflects the approach, often followed by competition authorities, of asking whether, based on the price, characteristics and intended use, the services under investigation could be considered substitutable.
- 2.11 The use of price as a comparator to determine whether services form part of the same market may be of limited utility when the price is set by a regulatory or a dominant operator. As indicated above, there appears to be no consistent view across Europe as to the appropriate charging structure for Internet calls. Therefore although, in this context, the price would tend to indicate that the two services are in the same market, this may simply be a reflection of the market power of the PSTN operator. It is probably more relevant to examine the intended use, which would suggest that they are in separate markets. This of course may change, with the widespread use of voice over Internet protocol (VOIP), which would offer substitutability in relation to the routing possibilities of a voice call.
- 2.12 This conclusion sheds some light on the question of whether it is an abuse of a dominant position for a PSTN operator to charge, at the wholesale and/or retail level, the same price for carrying a voice call as it does for carrying an Internet call. If it is established that a charging regime limits the emergence of a distinct market, and that an alternative pricing policy could be implemented which represents a welfare gain, a refusal to introduce a new charging regime could be considered an abuse.
- 2.13 It may therefore be appropriate to adopt a narrow market definition at the retail level, e.g. the market for dial up access to the Internet. However, the analysis set out below does not depend on this, and the economic arguments remain essentially the same whether or not there is such a distinct Internet market.

- 2.14 In passing, however, it is interesting to note that the Commission, in the *Atlas* case, identified the following services:
- data services: high- and low-speed packet-switched, Frame Relay, Internet Protocol (IP) services;
 - value-added application services: value-added messaging, video-conferencing and electronic document interchange (EDI) services;
 - voice VPN services;
 - value-added leased lines offerings: pre-provisioned, managed and circuit-switched bandwidth;
 - very small aperture satellite (VSAT) network services, and
 - outsourcing;

- 2.15 While many of these are services provided over the same physical network, the Commission has taken the view that they may constitute separate relevant markets:

“Whether each of the services listed above constitutes a separate product market can be left open for present purposes, since a separate analysis would not affect the Commission’s conclusions.”³

- 2.16 We therefore leave open the question of whether, for the purposes of competition law analysis, call origination and termination for Internet access should constitute a separate market. Indeed, the conclusion on this question does not affect the analysis below, which suggests that, in some cases at least, current charging structures do not properly reflect the costs of provision, and that identical charging for Internet access and voice telephony could be inefficient and lead to under utilisation of the network.

3. Cost basis for Internet call origination charges

- 3.1 It was observed above that calls to the Internet and local voice calls are often charged at the identical rate at both the wholesale and the retail level. If the underlying costs that drive these two services are different, then an observation that the same price is charged for them raises two questions:
- Whether or not excess profits are being made in respect of one or other of them (or both of them in combination), and
 - Whether the pricing structure exhibits a detrimental form of discrimination, to the extent that services costing different amounts are being charged at the same price.

³ Para 6, Commission Decision IV/35.337

- 3.2 The analysis below concludes that there are efficiency arguments for lower pricing of Internet calls at both the wholesale and retail levels. Where Internet calls are priced at a higher level than voice at the wholesale level, the issues of excessive pricing and discrimination arise in a more acute manner.
- 3.3 The issue of excess profits may be embedded within a broader consideration relating to the form of price control applied to the telecommunications operator in question, to the extent that the regulatory system may permit high returns on some services, compensated by lower return on others. Such a regulatory policy can in principle fulfil the criteria of efficient network usage, efficient infrastructure investment and retail growth set out above. However these criteria would not be fulfilled were the practical implementation of the policy to lead to excess returns to one or both services in combination such that excessive profits were made overall or retail growth were stifled. Such a policy would risk falling foul of the EU regulatory policy and competition rules. In addition, the issue of prices being abusive by virtue of being unduly discriminatory would still merit independent consideration.
- 3.4 An appropriate definition of costs must underlie any calculation of returns. In relation to a particular telecommunications service, the range of possible cost definitions is extensive. They differ in relation to:
- Whether they are forward looking or based upon historically incurred costs, especially capital costs:
 - Whether they are computed over a period in which capacity is taken as given (the short run) or whether capacity is adjustable (the long run):
 - Whether they cover variable/operating costs only, or whether they also include (the short run or long run) fixed costs:
 - If they are calculated on a causally attributable or incremental basis, whether some allocation of joint or fixed costs is also imposed:
 - Whether the increment over which costs are estimated is a single unit (marginal cost) or whether it is the whole output of all of the service concerned (average incremental cost).⁴ The service might, in accordance with the earlier discussion, be either 'call origination' or Internet call origination.
- 3.5 The EU regulatory framework favours use of forward looking long run incremental costs (FL LRIC):

⁴ The marginal cost of a service produced by a multi-product firm reflects both economies of scope (any reduction from stand-alone cost) associated with joint or common costs, and cost reductions associated with economies of scale (resulting from the fact that the marginal or last unit is produced at a cost less than its predecessors). Average incremental cost only incorporates from the former effect.

*" charges for interconnection based on a price level closely linked to the long- run incremental cost for providing access to interconnection are appropriate for encouraging the rapid development of an open and competitive market"*⁵

The Commission has also indicated that the forward looking long run incremental cost:

*"... provides an analytical framework which can be used to obtain an estimate of the cost that would be found in a fully competitive market."*⁶

- 3.6 The FL LRIC of operating the network as a whole therefore provides a useful indication of the likely costs in a fully competitive market. The FL LRIC of a particular service similarly provides a useful indication of the costs in a competitive market. It is, however, important to distinguish between the FL LRIC of operating the network as a whole, with the FL LRIC of providing a particular service over that network. Where excess capacity exists, services which use that excess capacity would not tend to impact on network dimensioning, and therefore the FL LRIC of a such service could be significantly lower than the FL LRIC of operating the network as a whole. Prices as low as long run, or even short run, marginal costs – which may be little different from zero – may be justified in such circumstances.
- 3.7 These relationships between price and causally attributable costs suggest that a different treatment of joint and common costs may, depending on the circumstances, be justifiable. Because such costs are not causally attributable to a particular service, there can legitimately be some latitude in the manner in which they are recovered. To the extent that pricing differentials derive from justifiable variations in the mark-up over incremental costs to cover joint and common costs, they can enhance efficiency and need not be anti-competitive.
- 3.8 Our conclusions at this stage can therefore be summarised as follows:
- FL LRIC costs provide an appropriate method of determining the costs which would prevail in a competitive market;
 - The FL LRIC of services provided where there is excess capacity may be substantially smaller than the average FL LRIC of operating the network as a whole, and may approach long run, or even short run, marginal costs;
 - The benefits of encouraging efficient network usage may support variations in the allocation of joint and common costs between different services.

⁵ Directive 97/33/EC of the European Parliament and of the Council of 30 June 1997 on interconnection in Telecommunications with regard to ensuring universal service and interoperability through application of the principles of Open Network Provision (ONP), [1997] OJ L 199/3 at recital 10

⁶ Commission Communication on interconnection pricing in a liberalised telecommunications market, [1998] OJ C 84/3 at point 3.3

The cost drivers of call origination

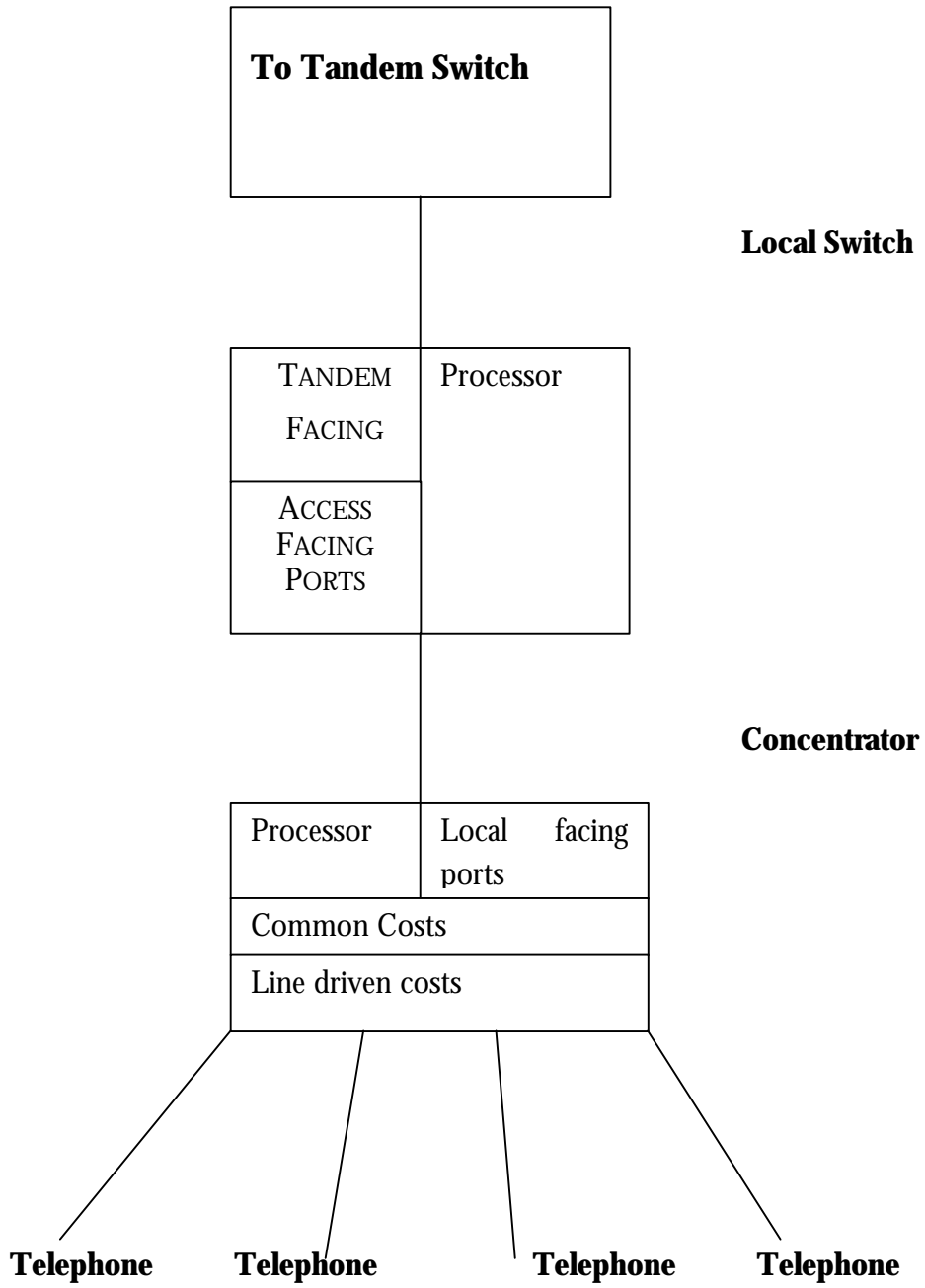
- 3.9 We now review the cost drivers of call origination within this framework, focussing upon two issues in particular. The first is the way in which call set-up costs are recovered in a per-minute price for calls, at either retail or wholesale level. If set-up costs are incorporated in per-minute costs on the assumption that all calls are of uniform length, then short calls may end up undercharged and long calls overcharged.
- 3.10 The second question, considered in the next section, concerns the way in which joint and common costs are recovered in the prices of different services.

Call Setup Costs and Call Origination

- 3.11 key factor in determining the appropriate retail price for call origination is the costs of call origination and - by extension - the appropriateness of a per-minute wholesale pricing regime. If call minutes were the sole cost driver for call origination, then per-minute charging would be cost reflective. However, that is not the case, and there is a significant risk that simple per-minute charging might lead to distortions. This section focuses on the distortions caused in circumstances where calls vary significantly in length as a result of an increasing proportion of long calls associated with Internet usage.
- 3.12 his point is illustrated by an examination of the factors driving switching costs in a standard engineering bottom-up cost model (see figure). Call related costs in the remote concentrator and local switch comprise two elements: processing costs, driven by busy hour call attempts, and port costs, driven by busy hour erlangs or traffic flow. Once the concentrator and switch have been dimensioned by these magnitudes, the investment cost is determined. It is then expressed in terms of an annual expenditure, using appropriate cost of capital and depreciation rates.
- 3.13 The annualised cost is then expressed in terms of a per-minute charge or a charge per call attempt on the basis of a chosen relationship between peak and off-peak rates ("the tariff gradient") and the anticipated distribution of traffic over the day. (We return to the tariff gradient below). The incremental cost of call set up or call minutes is then found by adding operating costs (which may vary over the course of the day) to these time-variant capital costs.

FIGURE 1

COST CAUSATION IN THE SWITCH



- 3.14 Note that we are making the assumption here that the least (incremental) cost way of dealing with Internet traffic is to use the voice network. To the extent a case can be made that lower cost techniques exploiting the packet-switched nature of the traffic are available, and that forward-looking costs can be evaluated on the basis of this 'modern equivalent asset', there would be a cost differential from voice traffic. Unfortunately, we lack the data to quantify this major consideration. However, there is an important point which must be emphasised here: if the costs of the alternative technology were less than the incremental costs (taking Internet calls as the increment) of the existing technology, but the charges were higher (e.g. LRIC for the larger increment), this might lead to inefficient bypass.
- 3.15 It is clear that a call origination charge set exclusively in per-minute terms runs the risk of giving a distorted picture of the underlying costs, the distortion being the greater the higher the component of costs which are driven by call attempts and the greater the dispersion of call lengths. If, for example, a quarter of the total long run incremental costs associated with the switch were driven by call attempts and if calls were of two types, with 90% of two minutes duration and 10% of 50 minutes duration, then an LRIC call origination charge based on call minutes would "overcharge" 50 minutes calls by 27% and 'undercharge' two minutes calls by 38%.
- 3.16 The data from the Oftel cost model suggest that call set up costs (per successful call) amount to 1.22 Eurocents. The per minute traffic cost is 0.83 Eurocents. When the call set up cost is assimilated in the per minute charge (by adding 1.22 cents to the per minute cost for a one minute call, 0.61 to the per minute cost for a two minute call etc), the implied cost per minute for calls of different duration is as set out in table 1, the implied cost per minute for calls of different durations is as set out in Table 1.

Table 1

Minutes	Cost per minute. (Eurocents)
0.5	3.27
1	2.05
3	1.24
5	1.07
10	.95
30	.87
60	.84

- 3.17 These data demonstrate a significant departure from cost reflectiveness resulting from the assimilation of the set up charge in a per minute charge.

3.18 The validity of the case for a two part interconnection charge is reflected in practice within the European Union. Thus the incumbent operators in the Netherlands, Sweden, Belgium and Eire (as well as Telenor in Norway) charge for interconnect on the basis of a fixed rate per successful call, as well as a per minute charge. The incumbent in Denmark charges on the basis of a fixed charge per call attempt and a per minute charge. The per call charge as a proportion of the total charge for a three minute single tandem interconnect charge averages at 25%, as against the estimate of 30% derived from the cost model.

Peak/Off Peak rates

3.19 As noted above, the costs of a telecommunications network are largely driven by peak hour requirements. In particular, this applies to switching and transmission capacity. Costs which are not driven by peak hour capacity consist largely of maintenance costs, certain building costs and overheads.

3.20 The theory of efficient peak load pricing suggests that the relationship between peak and off-peak pricing should be such that capacity costs driven by the peak are recovered in peak pricing, while operating costs, and - possibly - overhead costs - are recovered on the basis of through-put. If, however, the effect of such a charging mechanism would be to shift the pre-existing peak, then capacity costs should be recovered from traffic in all periods which might potentially form the peak, by setting charges at levels which, as nearly as possible, equalise the load over all such periods. This arrangement ensures that traffic is spread as evenly as possible, minimising the requirement for capacity and reducing average costs.

3.21 It is also consistent with LRIC costing principles, since off-peak demand is satisfied by capacity which is installed to meet peak demand, and hence is not causally associated with that capacity: i.e. if off-peak demand were zero, the capacity would still be there. In other words, as off peak calls do not impact on network dimensioning, the incremental cost of off peak calls is low. The LRIC averaged over off-peak calls is hence low.

3.22 Existing relationships between peak and off-peak prices for voice telephony at both retail and network levels have not been designed to achieve exclusively these objectives. In particular, off-peak rates, at least for certain periods of the week, probably exceed marginal or operating costs by a considerable amount. Tariff gradients for voice at the retail level which are often based upon convention or historical accident are, in many countries, simply read across into equivalent wholesale tariff gradients.

3.23 These departures from full cost reflectiveness operate particularly against the interests of Internet users who may make long off-peak Internet calls, but the negative impact need not be restricted to such Internet calls.

3.24 Ideally, incremental Internet calls (and other calls) would be priced in way which filled up the capacity of the network at all times, provided that they exceeded the marginal cost of the calls. This is obviously difficult to achieve perfectly, but there is scope for

innovative tariffs which would encourage network users. These might take the form of flat rate charges for period where there was no risk of hitting capacity and where marginal usage costs are extremely low. This may include weekends.

Effect of revised charging schemes on third parties

- 3.25 Pricing of network usage can have important effects on both alternative network operators, and downstream users of the network. Provided that a charging regime complies with the above principles, in our view such a charging regime would not have anti-competitive effects.
- 3.26 First, in our view, such a charging regime escapes the charge of predatory conduct. We have suggested above that low off-peak charges are not at odds with LRIC pricing, estimated over an appropriate time-of-day period, as this can encourage efficient use of the network. The legitimacy of such a pricing policy was recognised in the discussion of predation in the Commission's Access Notice (at fn85):

“...when infrastructure capacity is under-utilised, charging a different price for access depending on the demand in the different downstream markets may be justified to the extent that such differentiation permits a better development of certain markets, and where such differentiation does not restrict or distort competition. In such a case, the Commission will analyse the global effects of such price differentiation on all of the downstream markets.”

- 3.27 Secondly, such a variation in the current charging structure would not impact negatively on efficient infrastructure investment. Determining whether infrastructure investment is efficient requires, in part, an analysis of the optimal usage of any existing network infrastructure. The current charging structure in many countries militates against optimal usage of the network in that it does not serve to encourage the use of excess (off peak) capacity. Seeking alternative infrastructure investment by constraining the optimal usage of the existing network would not normally be expected to lead to an efficient outcome.

Capacity Charging

- 3.28 An alternative way of expressing these arguments is in terms of the notion of capacity charging. If the principal driver of network costs is peak-hour capacity, then it might be both more natural and more efficient for inter-operator transactions to be undertaken in units of capacity rather than (as at present) call-minutes. This approach has been considered at various times, by both NRAs and the Commission. If it were adopted, it would then be in the interests of an operator which had bought capacity to seek to fill it in ways which maximise its revenues using whatever retail tariffing methods it found appropriate. It is likely that these would include significant time of day and day of week price differentiation, as well as flat-rate charging, at least up to certain quantity limits.

Internet Calls as the Increment

- 3.29 The discussion above has treated voice calls and Internet calls as together forming the increment over which average incremental cost is computed. However, this approach is not required by logic or economics. We have noted above that an argument can be made in favour of the conclusion that voice and Internet calls constitute different markets, and have also noted that different technological possibilities exist for conveyance of the two types of calls. In these circumstances, it might be legitimate to compute incremental cost averaged over the origination or conveyance of Internet calls alone.
- 3.30 An exercise of this kind was undertaken by Oftel in connection with the network costs associated with a particular category of Internet costs, namely those associated with the costs of providing continuous ISDN2 or PSTN access to schools in the U.K., on the basis of B.T.'s existing networks and services. The costs excluded (as compared with those relevant for larger increments) are essentially those of fibre and civil works associated with transmission from remote to local, local to tandem and tandem to tandem. As a result of the calculation, Oftel estimated a long run incremental cost level for B.T. offering an end-to-end service to schools for access to an Internet service provider of 635 Euros per annum.
- 3.31 Of course, the increment in question here – Internet use by schools – is significantly smaller than Internet use overall. Internet use in schools would, on the other hand, typically be during peak hours for network usage. However, the surprisingly low figures do suggest that a redefinition of the increment can have a significant effect on cost estimate.

4. Demand Side issues relating to Internet call origination

- 4.1 In a telecommunications network, while many costs can be causally attributed to particular activities, there remains a residue of common costs – at various levels. This is illustrated in figure 1 above, which points to the existence within the concentrator of costs which are common to both call attempts and call minutes. However, common costs can also be found at much higher levels in the network or company hierarchy. The manner in which these are recovered can be determined by a variety of objectives. In pure efficiency terms, one major candidate for determining how they should be allocated relates to the demand characteristics of the service for which they are used. According to this so called Ramsey-pricing principle, network inputs used in the provision of final services for which demand is relatively responsive to price should have a proportionately low allocation of common costs, while the same inputs used in the production of services demand for which is not sensitive to price should have a higher allocation.
- 4.2 Identifying the precise demand characteristics of different services – in this case voice telephony and Internet access – is not easy. However, the following simple thought experiment suggests a ranking of the two. Suppose Internet access and local calls are initially charged to the same rate; they are then made available at an un-metered rate;

which service will generate the larger proportionate increase? In our view, the fact that Internet access is a solitary rather than a bi-lateral activity makes it much more likely that it would exhibit the greater proportional growth in traffic. Equally, if the direction of the price change were the opposite, so that both voice calls and Internet access were charged at a national, instead of a local rate, we conjecture that income constraints would have a much larger impact on Internet access than on voice calls. The price sensitivity of Internet users can, perhaps, be demonstrated by developments on the UK market over the past 12 months, where the launch of a subscriptionless ISP service by a number of operators led to a significant growth in the size of the market.

- 4.3 Governments and regulators may wish to add to this efficiency related argument, a second argument based upon the public policy objective of expanded Internet use as a means of generating benefit for the wider economy, and of doing so in a way that makes Internet services available to the population as widely as possible, thus achieving equity objectives at the same time.
- 4.4 A final consideration relates to the implications for pricing of externalities. A subscriber who accesses an Internet site creates incentive for the site owner to improve that site, and hence benefits other subscribers as well (in the same way that a user of an automatic teller machine encourages wider installation of such machines and hence benefit other users). The argument in favour of beneficial externalities for voice telephony is rather weaker, because both business and residential subscribers generally have mechanisms for internalising it. This consideration may provide an additional basis for lower call origination rates for Internet access.

5. Call Termination

- 5.1 Much of the above discussion of the costing and mode of pricing of call origination reads across to call termination, and for that reason is not repeated here. However, it is important to note that unlike call origination markets, call termination markets to ISPs may often be competitive and as such regulatory intervention may be not only unnecessary but also inappropriate. This is because there is a set of issues surrounding the setting of the call termination charge for Internet access distinct from those issues relevant to origination. The key point is that there is a crucial difference between the circumstances in which call termination is bought by a subscriber's operator to complete a voice call, and the circumstances in which a terminating operator is chosen by an Internet service provider (ISP) in order to offer a subscriber Internet access. In the former case (the voice call) the terminating operator controls access to the called party, and there is therefore a case for controlling the price of this bottleneck. In the latter case (Internet access) the ISP may be able to choose from a range of competing operators the one which will terminate its calls, and have real incentives to seek out the best available offer. Regulation of the termination price can therefore be dispensed with, in favour of competition.

- 5.2 One of the consequences of regulating termination unnecessarily appears to have been that the regulated rate has been set above the level of real costs, forcing up call prices but enabling a subsidy to be paid by the call terminator to the ISP. This hidden transfer can then be used, for example, to facilitate a subscription-free Internet service (often simply known as a “free” Internet service). It is clearly beneficial to consumers that because of the competition in the termination market, the excess interconnect receipts must be shared with the ISPs, which in turn reflect this in their retail prices as they too are active in an intensely competitive market. However, compared with an arrangement in which the subscriber directly or indirectly pays a cost-related price for each service, the system has a number of disadvantages. First, it is not transparent. Secondly, it is inflexible in the sense that there is no necessary connection between the proportion of the termination fee transferred to the ISP and the cost of providing a free Internet service. It may thus place ISPs in a position in which they can make excess profits or, if the market is competitive, where the quality of the service provided is determined not by customer preference but by the extent of the transfer of funds from the terminating operator to the ISP.
- 5.3 The more satisfactory solution is to allow Internet access and Internet services to be provided at prices which are brought into line with costs through regulation until full competition has developed, and subsequently by the market. If termination prices were de-regulated for Internet access, and retail prices could be chosen by the terminating operator (via, for example, a special number), then the ISP could, in a competitive market, choose both the operator on which its calls are terminated and the price at which its customers dialled in to its service. Price competition could thus be introduced not only in relation to the Internet access part of the ISP’s service, but also in relation to the price paid for the consumer to access the ISP itself. It should be noted however, that the extent of price competition allowed by this system would be limited by the tariff options available for call origination, discussed above.

6. Conclusions Concerning More Efficient Pricing Options

- 6.1 In this paper we have examined certain considerations which are relevant in deciding whether call origination charges should be the same or different for voice calls and Internet access. This is an important issue from the perspectives of both public policy directed at efficient pricing and competition law.
- 6.2 A discussion of both the competition and public policy issues at stake here must begin from an analysis of costs – mainly long run incremental costs. In this connection we have noted that:
- Because of call set-up costs, if call origination is priced exclusively on a per minute basis, then there will be a systematic tendency for longer calls to be charged at a higher rate (in relation to the costs) than shorter calls;

- Because much residential access to the Internet occurs at off-peak times, the question of the balance between peak and off-peak rates acquires new significance. It is likely that the current relationship between the rates in many member states fails adequately to reflect low off-peak costs;
 - If incremental costs are computed over the increment of Internet access rather than call origination as a whole, they are likely to be reduced, possibly by a significant amount. This alternative form of calculation is appropriate whenever there is a lower cost alternative method of dealing with Internet traffic.
- 6.3 Finally, to the extent price elasticities of demand are higher for Internet access than for voice telephony, it is efficient to recover more (proportionately) of common costs from the latter than the former.
- 6.4 In relation to competition law in particular, we have noted that an argument may be made at the retail level for treating voice calls and Internet access as representing two distinct markets. The more important point, however, is that, to the extent that a dominant PSTN operator possesses market power in call origination, that operator may be able to exercise price discrimination, in the form of charging a uniform price for two services, the costs of which diverge. The effect of this may be to limit the development of a number of markets (in particular that for access to the Internet), to the detriment of customers and competitors. Equally significantly, absent very intrusive regulation, such an operator will have little incentive proactively to introduce efficient tariffs.
- 6.5 Finally, there are strong efficiency arguments in favour of de-regulating the termination market for calls to ISPs in circumstances where this de-regulation can lead to lower consumer prices and increase retail price competition between ISPs.

7. Recommendations

In the light of these considerations, we recommend that consideration should be given to adopting levels and structures of retail or wholesale charges for call origination depending on the use to which call origination is being put. This includes considering the implementation of one or more of the following options:

- The adoption of two-part wholesale tariffs
- Steeper peak/off-peak tariff gradients which better reflect relative costs
- Differentiation of wholesale tariffs to reflect differences in demand characteristics for retail services. When special Internet call rates exist at the retail level, on competition grounds these should also be reflected in wholesale prices charged by the dominant operator.
- The exploration of the possibilities of unmeasured service at a flat rate, possibly confined in the first instance to periods of low demand such as evenings or weekends.

Again, when these are made available at retail by the dominant operator, an equivalent tariff should be available at the wholesale level.

- The de-regulation of Internet call termination prices (which will require the enabling of a range of retail price points).