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REFILE AND ALTERNATE CALLING PROCEDURES: THEIR IMPACT ON ACCOUNTING RATES AND COLLECTION CHARGES

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FOREWORD

This paper was presented and discussed by the Ad hoc Expert Group on International Telecommunication Charging and Accounting Practices. It was then agreed to submit the paper to the Committee for Information, Computer and Communications Policy who recommended its derestriction at its meeting in October 1994.

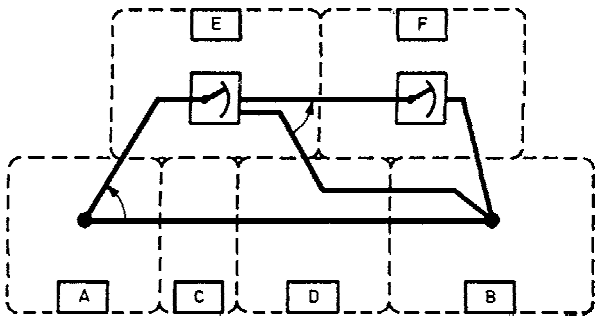
REFILE AND ALTERNATE CALLING PROCEDURES: THEIR IMPACT ON ACCOUNTING RATES AND COLLECTION CHARGES

1. Introduction

Traditionally international switched telephone traffic has been handled by international public telecommunication operators (who in most cases have exclusive responsibility for switching and transmitting voice traffic). These operators through bilateral agreements agree on handling and terminating each others calls in their national markets. Payment for this service has been through the accounting rate system. The provision of such services has therefore tended to be viewed as a joint activity between the national telecommunication carriers responsible for the provision of international service.

Despite this notion of joint provision of services the typical exchange of traffic between various countries takes place using different infrastructures and different routes depending on circuit availability, repair and maintenance requirements, etc. **Figure 1** shows a sample configuration of various fixed link routes for traffic between countries: exchange of traffic can take place on direct leased circuits through neighbouring countries, or on switched transit circuits through one or more countries. The figure shows that it is normal practice for operators to use both direct and indirect routes to terminate traffic.

Figure 1: Examples of the various procedures for remunerating administrations



The diagram shows a typical pattern of circuit interconnections between various countries, with particular reference to the exchange of traffic between countries A and B carried partly on direct circuits through countries C and D, and partly on switched transit circuits through country E -- which in turn may make use of transit-switching facilities in country F.

Source: ITU, Telecommunication Standardisation Bureau.

There have been, until recently, limited options available for customers for international voice communications: these options have been mainly to use operator assisted services or international direct dial calls. A number of recent changes have had important impacts on international market developments. Technological change has provided reprogrammable terminal equipment which, at low cost, allow for the setting-up of international services using as required the resources of public switched networks. Increased intelligence in switching technology has also allowed public telecommunication operators to use their infrastructure in a more flexible way to provide a range of differentiated services. Regulatory changes have facilitated the connection of terminal equipment to network infrastructures, have improved conditions of access and use of leased circuits, and have in many countries liberalised resale opportunities.

These developments have led to the emergence of a number of new telecommunication services (usually by enhancing voice and fax services) and, in turn, are providing the leverage to open international markets. As well, by taking advantage of arbitrage opportunities many of these new service are impacting on international prices and the international telecommunication payments structure. These new services will play an important role in changing the traditional structure of joint provision of international switched telephone service.

A driving force behind the demand for these new calling services is the fundamental restructuring in industry, enterprise structures and relationships. The use of multi-sourcing in production, and the development of global marketing concepts, have led to greater demand for integration between production units, and for these production units to be linked closer to their end markets. The development of global service markets -- banking, tourism, transport, financial markets -- have also stimulated the requirement for increased integration among enterprises and with their markets. The above developments have significantly stimulated the flows of information (voice, data, fax) and, in turn, the demand for global telecommunication services. They have also led to changes in the international telecommunication market which is becoming global rather than country specific in terms of traffic streams.

The purpose of this paper is to examine issues related to the practice of refile of telecommunication traffic and other alternate calling procedures with regard to their impact on telecommunication accounting rates, settlements and collection charges. This is a new emerging area of competition for traditional operators, and tends to be sensitive in view of the direct impact such competition has on operator's traffic and prices, and with regard to the regulatory status of some services. As a result there is at present little information available to undertake in-depth analysis.

There are a number of reasons why services, which in this paper are commonly referred to as alternate calling procedures (ACPs), are emerging. There is foremost an incentive to arbitrage prices, whether they be accounting rates or collection charges. Arbitrage opportunities occur because of price asymmetries and divergencies of prices from cost. The greater these divergences the greater the incentive to participate in arbitrage. Competitive markets, by driving price toward marginal cost, reduce arbitrage opportunities but may not eliminate them totally. This is because asymmetries may continue to exist because of differences in time zones which allow service providers to take advantage of off-peak rates, local cost conditions, exchange rate variations, etc. In a number of cases alternate calling procedures may serve a specific market requirement and, while such services may be more expensive than direct calling, they continue to be valued by users. As well, with the increase over the last five years in inter-continental telecommunication transmission capacity, and national capacity with investment in fibre cables for trunk networks, costs of transmission have declined significantly. As a result, as the marginal cost of handling traffic has become very low, the focus of telecommunication operators has shifted to stimulating growth in traffic and, especially, their own share of traffic.

Arbitrage of collection charges is usually being taken-up by small enterprises using essentially terminal equipment to provide services. Arbitrage of accounting rates usually results from activities of resellers or from the public telecommunication operators themselves. A specific characteristic of the types of services and practices which fall under the heading of refile and alternate calling procedures is that rapidly changing technologies imply an equally rapid evolution of the services and the possibilities of using central switching and customer premises equipment to provide services. The extensive international private networks which are available are also providing opportunities to use spare capacity. A number of the large

multinational companies have also entered into agreements with public operators and generate important flows of traffic and revenue for these operators.

The developments in the market probably implies that there will be continuous evolution in these services. As well, as the international telecommunication environment changes, especially with the emergence of increased competition, a number of new forms of service provision and structures will emerge.

The different services and calling procedures need to be differentiated according to their customer base: in some cases these are aimed at the final customer (business and residential), in other cases the services are carrier services, that is they affect the interrelationship and flow of major streams of traffic between carriers.

2. The revenue equation

A public telecommunication operator (PTO) obtains revenue from international calls, both outgoing and incoming calls. This revenue is determined as follows:

Outgoing calls:

(1)	Revenue from collection charge	=	Minutes x collection charge to country A
		less	
(2)	Settlements owed to foreign operators	=	Half accounting rate x outgoing minutes to country A
		plus	

Incoming calls:

(1)	Settlements received from incoming calls	=	Half accounting rate x incoming minutes from country A

Operators earn revenue directly from customers (business and residential) and from other operators and service providers. This revenue comes, as indicated above, from outgoing and incoming calls as well as from transit traffic; their total international revenue is the sum of net outgoing revenue plus incoming revenue. It is normally considered that there are lower costs for incoming calls than for outgoing.

Changes in the flow of traffic, either incoming or outgoing, have a revenue impact. Increased outgoing minutes, with no change in the other variables, will increase net revenue. Reverse charge type calls, which increase outgoing minutes and have a price premium, will act further to increase revenues. Increased incoming minutes will also increase revenue but less than outgoing minutes (unless half the accounting rate is equal to the collection charge). Reduced accounting rates will increase net revenue from outgoing calls, but will also reduce incoming settlements revenue. If outgoing traffic exceeds incoming then a reduction in accounting rates will have a net benefit. Such a reduction in accounting rates also facilitates the reduction of collection charges which, depending if demand for international calls is elastic, could stimulate outgoing traffic and therefore net outgoing revenue.

Depending on the nature of the call, a call which is reversed will result in revenue from collection charges, a settlement outpayment, but also the loss of an incoming settlement. In this case the call is one which would have been made on a direct basis. A new call which is stimulated by the availability of call reversal cannot be considered as resulting in the loss of an incoming settlement. In practical terms it would be difficult to distinguish between the different calls.

Where there are two or more operators from one country their revenue relationship with another country changes. This is because of proportionate return policies which require that the sending operators (country A) receive traffic from the operator or operators in another country (country B) in proportion to the traffic they send to that operator (relative to the total traffic sent to country B). An operator that manages to increase outgoing minutes either directly or through reverse charge type calling obviously obtains an advantage from proportionate return traffic policies.

To summarise, revenue of operators is impacted by factors affecting the number of minutes of traffic and the direction of the flow of minutes. The level of collection charges, of accounting rates, and relative differences between the two, also affect revenue.

3. Refile and Alternate Calling Procedures

Strict definitions of different processes and procedures for transmitting calls are neither possible, nor necessarily desirable, in view of shifting service technologies and calling procedures. The aim of this section is essentially to try and clarify some of the existing or potential practices. Much of the discussion on the issues covered in this paper use different terminology to refer to fairly similar services. Many of the different services, or technologies to provide the services, can be variants of one or more of the other services depending on how they are accessed and offered. Although many of the services offer voice telephony they may provide features which some public telecommunication operators do not yet provide, for example, detailed billing.

Technological change has been cited above as being important in development of these new services. A second important factor is the ability to pay for services and to debit customers on a transborder basis resulting from the liberalisation of financial markets and the availability on a global basis of credit card facilities.

3.1 International Direct Dial Calls (Sent Paid Calls)

International direct dial (IDD) calls are those normally used between OECD countries and globally. The call originates and is billed in the same country and is charged a collection charge in the originating country. Settlements are dependent on accounting rate arrangements between the call originating and terminating countries. Calls may transit through 3rd countries either through leased facilities or through the PSTN in which case the transit country may receive a transit charge. Relative traffic volumes and the direction of calls may be influenced by the price of calls, the availability of off-peak charges and network quality, as well as social and economic characteristics.

Reductions in collection rates reduce revenue unless international calling is price elastic. Reductions in accounting rates increase revenue from outgoing calls and reduce revenue from incoming calls. Even if many of the alternate call processing arrangements described in this paper may take traffic directly from public telecommunication operators, they also play an important role in stimulating the overall growth of international traffic. They may therefore have a net positive effect on traffic growth of PTOs.

3.2 Collect calls (reverse charge calling)

Such calls originate in one country, but are billed in the terminating country and are subject to a collection charge in effect in the country of the called party. Settlement payments for a collect call are the responsibility of the operator in the country where the call is billed to the service provider from the country where the call originates. Generally the same accounting rate is used for IDD calls and collect calls, but a surcharge that is payable to the service provider country of origin for each collect call may be added to the settlement obligation. A collect call generates an incoming settlement to the country originating the call. A collect call generates higher revenue for the service provider in the call terminating country than if the call had been a direct incoming call. These calls may be taken into account for purposes of proportionate return of traffic.

Collect calls, unless the volume is considerable in a bilateral relation, are unlikely to have much impact on collection charges or on accounting rates.

3.3 Credit card calls

The charge for an international credit card call is billed to the credit card holder and often results in the billing of a call in a county other than the country where the call originates. This method of paying for a call is used in conjunction with several call processing arrangements. The collection rates that are used to determine the charge for a credit card call and the settlement obligations for such a call depend on the particular type of telephone service selected by a customer and the location of the service provider used. These types of calls include IDD calls.

3.4 Country Direct Service

Country Direct Service (CDS) enables an international credit card holder (usually a card issued by a PTO) to gain direct access to an operator or automated credit card system in a second country by calling an international toll free number. In that the customer usually first dials a toll-free access number these services are similar to Freephone services discussed below. Traditionally, CDS services are provided to residents of the country of the card-issuing operator who are travelling. Collection rates charged to the card user are those of the PTO issuing the card. There is usually a surcharge on collection charges imposed on CDS users. Settlement obligations are owed by the service provider in the call terminating country to the service provider in the country where the call originates. CCITT Recommendation D.116 suggests using the same accounting rate for Country Direct Service as IDD service, unless otherwise agreed by the service providers. A CDS call results in an outgoing settlement obligation from the country being called.

Country Direct Services have been growing significantly. For example, in 1991 they accounted for 7 per cent US international message telephone service (IMTS) minutes. Moreover, they have become important in terms of traffic balances. CDS are not settled for separately from switched traffic. If viewed in isolation from other switched services and assuming that if a CDS call were not made, that a sent paid call would have been made from the other country, then on a purely mathematical basis CDS in 1991 would have accounted for 40 per cent of the IMTS traffic imbalance with the United States. Likewise, on a purely mathematical basis, CDS can be said to have accounted for 19.8 per cent of outpayments from the Caribbean Region in 1992 and 21.6 per cent in Hong Kong (1991).[1] BT estimates that in 1992 25 per cent of the US outpayment to the UK was attributed to country Direct Service. Data submitted to the NTIA (US) during its Notice of Inquiry[2] by BT indicate, for example, that AT&T's net revenue from UK country direct calls in 1992 was US$ 70 million less outpayments of US$ 16 million.

The success of these services has been based on a number of factors. In many cases CDS offered a financial saving in that, even taking into account the premium involved in using these services, it was often cheaper to use CDS rather than call direct. As international tariffs have declined this incentive is less important, although it still remains mainly because a number of hotels (especially in Europe) place a significant surcharge on international long-distance calls. CDS often allows users to by-pass these surcharges. CDS offers convenience to users in a foreign country by providing billing at home, billing to a company account, access to an operator using their own language, ability to make international calls from any location with a telephone, etc. It would seem that the longer term success of CDS will be the convenience factor rather than financial savings.

However, as PTOs include 3rd country calling (see below) as part of the CDS service it is then possible to use CDS cards from PTOs other than those of the home country. In this context competition will emphasise financial and service considerations.

A priori, country direct services would be expected to have an important impact. From a purely arbitrage perspective on the routes where there is a relatively heavy use of these services, they would be expected to be important in reducing asymmetric collection charges. It is not evident, however, that this has been the case, at least up to now. For example, country direct service has been used significantly

between the US and Germany (see below) but collection charges remained high and unchanged in Germany until recently.

Why is there insufficient pressure on collection charges from CDS calling? This may be because the country from which the call originates still obtains a settlement payment. If many of the CDS calls are made by business travellers, reducing collection charges to retain more outgoing calls may not be successful since these cards are used in particular for their convenience. The operator may prefer to maintain high collection charges on the premise that international calling is not price elastic and therefore net increases in revenue would not occur. In the case of Germany many users of CDS were US Armed Forces personnel who arguably would continue using CDS for convenience even if IDD calling was cheaper. Unless there is an important volume of residents of a country using CDS there is likely to be insufficient pressure on an operator to reduce collection charges. The fact that many operators facilitate the use of CDS by other operators may also imply that their impact is not so much on prices as in generating traffic for both operators.

CDS do not place direct pressure on accounting rates, rather since an incoming call is generated the call originating country obtains a settlement, which may provide an incentive to maintain existing accounting rates. But, as accounting rates are reduced, then there may be pressure on the operator to maintain more direct traffic to maintain income levels which may influence collection charge levels.

Since net settlement balances are generally calculated on a total switched service basis, all services play a proportionate role in contributing to the net settlements imbalance. However, Country Direct Services, and other services which act to reverse charges, play an important role in the flow of traffic and therefore in the balance of settlements. This can be illustrated in **Table 1** below. On the basis of the data it is evident that the settlements deficit between the United States and Germany changes significantly once reverse charging is taken into account. Of course, the table assumes that a reverse charge call would have been made as a direct call if Country Direct Service were not available. There are no studies supporting this assumption. Some and as many as three fourths of all CDS calls may not have been made. However, the numbers as such are not at issue here, rather the impact that Country Direct Services can have on the flow of traffic and settlement deficits if CDS services are viewed in isolation from other services. The data indicate the degree to which operators themselves by offering CDS have influenced traffic flows and therefore the flow of settlement payments. The extent to which a number of operators are promoting country direct services indicates that these services are profitable for them. The operators in countries that feel they are losing traffic to CDS and are interested in handling and billing for these calls themselves, have an opportunity, in fact an obligation, to develop and offer convenient, innovative services to compete with CDS.

Does a CDS call earn more revenue for the PTO issuing the card than a direct call? From the revenue equation above it can be seen that the card-issuer earns a collection charge (plus premium) by creating an outgoing call and in return a settlement payment needs to be made. If the call were an IDD call then only a settlement payment would be received, and these are less than collection charges. The potential to also convert an incoming into an outgoing call can be important with proportionate return since the net effect of the call will also likely be to generate an incoming call and a further settlement. There is therefore an incentive for CDS card issuers to maximise "outgoing" minutes by maximising card usage.

There is also an incentive for the operator issuing the card to place pressure for lower accounting rates since this would reduce the settlement payment made to the country from where the call originated while collection charges could remain unchanged. In other words, the greater the number of outgoing minutes an operator has relative to incoming, the more settlements are viewed from the cost side (an outpayment) than from the revenue side (an in-payment).

Table 1: Germany-United States settlement deficit		
Actual Deficit	1991	1992
US billed minutes (millions)	561.0	550.8
German billed minutes (millions)	208.8	232.6
Settlement deficit	**352.2**	**318.2**
Reverse charge minutes: Germany-US	147.0	135.3
Deficit Assuming Reverse Charge Calls Made as Direct Calls		
US billed minutes	561.0	550.8
Minus reverse charge minutes	147.0	135.3
Equals US billed minutes	414.0	415.5
German billed minutes plus reverse charge minutes	355.8	368.2
Settlement deficit	**58.2**	**47.6**
Source: Reply Comments of Deutsche Bundespost Telekom before Department of Commerce, National Telecommunication and Information Administration, Washington, Docket No. 921251-2351, 27 May 1993.		

3.5 Country and Beyond Service

Country and Beyond service (3rd Country Calling) enables a Country Direct Service card holder to use this service to gain direct access to an operator or automated credit card system in a second country by calling an international toll free number and then to complete the call to a designated third country (e.g. AT&T's World Connect and MCI's World Reach). Many PTOs do not allow carriers to offer 3rd country calling, even though they may have no means to monitor if this is taking place. The intermediate step by the operator is equivalent to refiling (or hubbing) as discussed below.

Collection rates of the service provider in the second country (plus any surcharge) apply to the call to the third country and the charges are billed to the credit card holder. Settlement obligations are owed by the service provider in the second country to the service provider in both the country originating the call and the country terminating the call. Despite two settlement payments these calls are obviously profitable and are being actively encouraged by major telecommunication operators. Clearly, as well, they stimulate outgoing calling and have an important effect on the balance of minutes.

Country and Beyond services can have important impacts on collection charges (more so than CDS calls) since these services allow customers resident in a country to completely by-pass their national monopoly for their international PSTN calls. But, the number of calls using Country and Beyond Service needs to be at a sufficiently high volume to make an impact on an operator in the country where the calls originate. Pressure can also be placed on accounting rates since through the use of refile the settlement owed to the destination country can be lowered by choosing a hub location (regulatory frameworks permitting) with a low accounting rate to major destinations.

3.6 Call Back Arrangements

This type of service, similar to reverse charge calling, enables a customer in one country to connect to an operator or automated system in a second country where the call is received. The automatic dialer (which can be a PBX or code caller) either calls the customer back at a predesignated number providing the customer a dial tone in the second country or patches the customer through to a number in the second or third country. This service is mainly available to a customer at a predesignated number so that it is not useful to mobile clients. As such it is a pure arbitrage service. The charges for such calls are determined by the service provider and will take as their benchmark the collection rates that are in effect in the country originating the call and the lower end of the benchmark the collection charges where the automated redialers are located. Such calls generate an outgoing call from the called country. Settlement obligations are owed by the operator in the second country to the operator in the call originating country. The service provider is often an entity independent from the PTO and will not be obliged to make settlement payments. For a call to a third country, settlement obligations are owed by the operator in the second country to the operator in the third country and the originating country.

Call back arrangements, since they target in particular residents in a country who call a terminating country frequently (and therefore provide a volume market for the new service provider) can be more effective in placing pressure on collection charges. However, they do not place pressure on accounting rates.

3.7 International Freephone Service

International Freephone Service, referred to in many countries as "800", "toll free", "Green" numbers or "Freephone" service, is a service which enables a subscriber (usually a business customer) to be allocated one or more special telephone numbers in one or more countries by the subscriber's service provider. Access to international toll free numbers is not universal, and as noted above a number of countries do not allow 3rd party calling on IFS. The United States has in particular good coverage with the major carriers offering toll free access to the US from approximately 75 countries. International Freephone service can be used by carriers to refile traffic. For example, if an operator has a contract to handle an international hotel chain's traffic, it is possible to route all international calls from that hotel chain through toll free numbers and then switch these calls world-wide. The applicable collection rates are those in effect in the subscriber's country, and all service and call charges are paid by the subscriber to the service provider. Settlement obligations are owed by the subscriber's service provider to the PTO in the country originating the call. These types of calls transfer outgoing call settlement obligations into incoming settlements.

Functioning as a pure "Green" or "800" number this service has little impact on either accounting rates or collection charges. Used as a means to refile traffic or as a part of Country and Beyond Service then International Freephone service can have important impacts on collection charges and accounting rates.

3.8 International Leased Lines connected to PSTN

An international lease line may be connected either directly or indirectly to the PSTN at the switch of the service provider or indirectly to a device on the premise of the customer of the leased line with the device subsequently connected to the PSTN. Accounting rates do not apply to services provided over leased lines. The service provider in each country sets a fixed charge for the half circuit it provides to the theoretical mid-point between the two terminals of the circuit. For an international call that either originates or terminates in a third country and uses the PSTN at either terminal of the leased line, the charges of such a call are based on the collection rates in the country in which the call originates. Settlement obligations are based on the terms of the bilateral agreement(s) between service providers in those countries that use the PSTN to provide service. Leased line resale is often most profitable where there are important volumes of traffic.

Once simple resale is allowed to a significant extent then pressure on collection charges and settlements will become much greater. Even with existing high prices for leased circuits the traffic volume required to equal the monthly cost of a 64KBPS circuit within Europe is already relatively low as shown in **Table 2** (as collection charges decline the number of minutes required increases).

As the use of international simple resale (ISR) increases among OECD countries it will generate opportunities for further by-pass and stimulate refiling. For example, ISR is now allowed on Canada-UK routes and between Canada and the US. Some resellers are already taking advantage of this by providing simple resale between the UK-US via indirect routes. A number of public operators are themselves entering resale markets. Simple resale has played a much larger role in placing pressure on accounting rates and collection charges in the relations where it has been introduced than any of the other alternate calling arrangements.

Table 2: **Number of minutes of IDD peak rate telephone calls required to equal the monthly cost of an intra-European 64KBPS circuit**

Between	Belgium	France	Germany	Netherlands	UK
Belgium	--	10 665	11 831	11 242	11 545
France	10 665	--	7 881	8 537	8 464
Germany	11 831	7 881	--	8 032	8 945
Netherlands	11 242	8 537	8 032	--	7 671
UK	11 545	8 464	8 945	7 671	--

Source: Lynx Technologies.

3.9 International Virtual Private Networks

International VPNs use components of the PSTN and leased lines in combination with data base profiles of previously identified customer locations and features to provide connectivity between customer locations ("on-net"), or between a specific customer location and other locations on the PSTN ("off-net"). Collection rates and settlement obligations may be affected by the various bilateral agreements associated with providing service over these networks although "off-net" calls are usually settled as IDD service.

IVPN services are targeted at multinational enterprises who normally use leased circuit networks. IVPN services are therefore unlikely to divert much traffic from the PSTN and may not place much pressure directly on collection charges and accounting rates. However, in providing IVPN services operators may set up hubs and resale networks so that in the longer term IVPN services may place pressure on international call prices and accounting rates.

3.10 Refile (Hubbing)

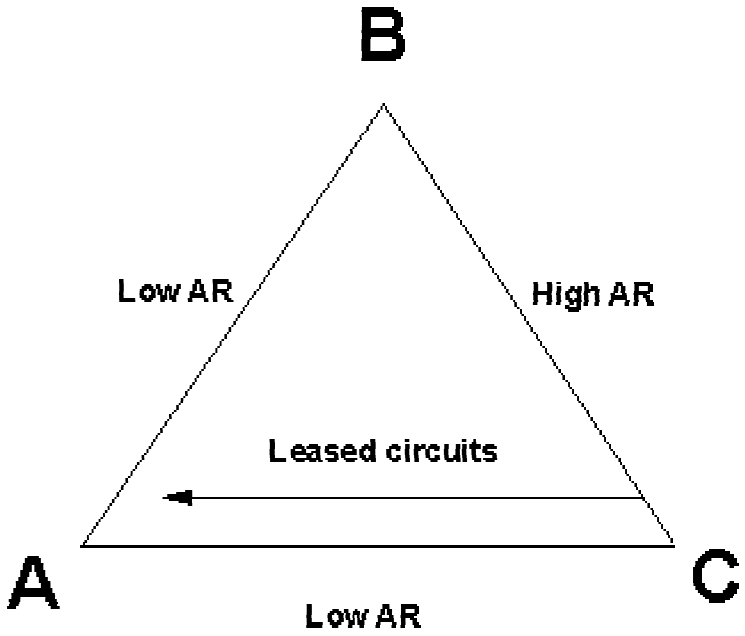
Refile or the hubbing of traffic is using one country to collect traffic and switch this traffic to other countries (similar to third country calling or call-back services). For example, the price of a call from Denmark-Finland-Australia is cheaper than a direct call from Denmark to Australia (see **Table A.1**; US$ 0.46 + US$ 1.03 compared to US$ 2.01). In this case a third country calling service would be viable having a margin of US$ 0.52 per minute.

The difference between refile and call-back services is that the former is usually undertaken on a larger scale, often by PTOs themselves, and often using leased circuits and public switched networks. The entry costs for refile services are therefore much higher than for call-back services, and the required volumes for profitability are also greater. Refile also tends to be a carrier service rather than targeted to individual customers as would be the case for 3rd country calling or call back services.

Hubs are usually placed in countries which have a relative cost advantage. For hubbing traffic to Western Europe, for example, it is relatively cheaper at present to locate the hub in the UK. This is because inter-continental calls to the UK tend to be cheaper, completion of calls to Europe from the UK also tends to be cheaper, and regulations are less of a problem. In hubbing the service provider acts to some extent as an international simple reseller. Refile can also take advantage of traffic volume discounts provided by operators. Practices such as hubbing can be expected to increase significantly once service monopolies are eliminated.

The rationale for refile can be seen from **Figure 2** below. If there is a high accounting rate between country B and C and a low accounting rate between A and B, then C with the co-operation of A can refile traffic to B via A. For this to be profitable the sum of the settlement for AB traffic and AC traffic must be less than for BC traffic. Alternatively, operator C can hub traffic in A using leased circuits to send traffic to A and then refile this traffic to B.

Figure 2: Traffic refile



Refile by arbitraging accounting rates can be a powerful tool to place pressure on these prices. Since refile also tends to deal in a much higher volume of traffic than many of the other alternate calling procedures discussed above, its impact is accordingly greater. In lieu of direct facilities-based competition at the international level which provides the solution to attain cost-oriented accounting rates, refile linked with international simple resale provides the best surrogate for such competition and should therefore be encouraged by regulators seeking to reduce accounting rates to cost.

One of the key issues linked with refile (as well as with international simple resale) relates to the hubbing of traffic and subsequent retransmission or termination of this traffic. A carrier, for example, can obtain an ISR licence in a foreign country which allows competitive provision of telecommunication services. The ISR licence is used to take traffic into the monopoly carriers home market and may be terminated in that country or switched to other destinations. The monopoly carrier does not pay a

settlement charge for the traffic and if traffic is retransmitted a settlement charge is paid to the terminating country. The caller does not pay a collection charge but will pay the cost of using the PSTN in the country of origin to the leased circuit (plus payment to the ISR provider), or if the caller is a corporate customer a dedicated line may connect the caller with the ISR service provider.

In this example the national carrier(s), although they receive compensation for the services they provide, are by-passed with respect to accounting and collection charges. If there is more than one national carrier the fact that outgoing calls are not going through PSTNs will also impact one of the carriers with respect to proportionate return traffic. This type of practice has already led to the Australian regulator to propose modifications to international simple resale regulations following a complaint by Telstra.

The above refers to hubbing of traffic mostly destined for the PSTN. Many carriers are now beginning, through VPN services and other managed data networks, to hub enterprise traffic which is mainly integrated voice and data traffic. Much of this traffic would have been on international leased circuits. It can be expected that these services will also have a beneficial effect on accounting rates but this will be more indirect. These services are important however in that they stimulate international competition between operators. They have also been important in forcing operators to view their market on a more global basis and to consider the necessity of forming alliances with other operators. Many countries and operators use their ability to hub cheaply as a selling point for their services. For example, Tele Danmark states that "... there is a potential to increase international transit traffic through the promotion of Denmark as an international telecommunication hub, including the use of Denmark by other international providers for switched transit traffic and the lease of transit lines."[3]

It is difficult to show refile opportunities given that accounting rate information is not available. For example, it would appear more profitable for originating operators from the United States to divert direct traffic to Spain via the United Kingdom. The settlement rate to the UK from the US is US$ 0.31 per minute and from the UK to Spain TEUREM rates would apply (likely to be under US$ 0.50). The potential saving from hubbing would be in the US$ 0.20-0.25 range. In Europe, both Sweden and the United Kingdom allow international simple resale. Their operators are in a strong position to take advantage of above cost accounting rates which exist in most European countries.

4. Arbitrage Opportunities

The tables in the Annex show the collection charges as of 1 January 1994 for individual OECD countries with other OECD relations, and the correspondent collection charge from that country. A first set of tables provide data for peak rates and a second set for economy (off-peak) rates. The difference in collection charges in bilateral relations is indicative of arbitrage opportunities. There are a number of reasons for these differences. First, collection charges in most cases are not market determined (except in the few cases where there has been effective competition among international operators). Second, while most OECD countries have stated intentions to rebalance telecommunication prices, the commitment to this and the extent to which it has taken place varies considerably from country to country. Third, the use of off-peak charging can result in significant price differences if the correspondent country does not provide off-peak rates as well as when countries are in different time zones. Fourth, arbitrage opportunities can also occur because some countries may impose a high initial minute charge or a three minute minimum charge (or even charge in units based on whole minutes rather than seconds). Fax messages, for example, are often less than three minutes so that call back services can exploit opportunities given by three minute minimum charges. Other factors would include: the technological level of the infrastructure can lead to cost and as a result price differences; differences in route volumes can create cost differentials; and, other economic and social factors could create differences in cost structures. But cost factors alone are unlikely to lead to the large differences evident between some bilateral relations.

The data show extensive arbitrage opportunities based on significant differences in bilateral collection charges. In a number of cases (such as bilateral relations between Austria-Greece; Denmark-New Zealand; Norway-Japan and for Turkey with many OECD relations) differences in bilateral collection charges are equivalent to the collection charge of one of the bilateral partners. Price differences arising

from competitive markets are quite evident: the UK-US/Canada rate is $US 0.65 compared to Germany-France of $US 0.70. On Japan-US relations, based on existing peak rates, the dollar difference between the two collection charges is $US 0.20; because of the quite high collection charges Japan has with other OECD countries the difference between bilateral collection charges are much higher with these relations and this could imply that opportunities for call-back operators are significantly unexploited. It should be noted, however, that the high appreciation of the yen has been a factor in creating relative price difficulties.

Within the European Union the policy by a number of operators of charging the same collection charge to EU Member countries (or minimising the number of zones), beside being discriminatory and creating market distortions contradicts TEUREM Recommendations and Community policy of cost-oriented tariffs (**Table A.3**). The arbitrage opportunities are there but have not been exploited as much as transatlantic opportunities because of regulatory restraints. This is changing given more open markets in a number of Community countries.

Differences in bilateral collection charges may offer an arbitrage opportunity, but not necessarily a business opportunity. This is because traffic volumes may be insufficient on some bilateral routes to invest in new services.

Accounting rates also offer arbitrage opportunities. These are difficult to evaluate given the lack of data on bilateral relations. However, based on existing information, important differences are evident which would imply opportunities to arbitrage. From **Table 3** which shows half the peak accounting rate of OECD countries with the United States some of the potential opportunities can be discerned.

Table 3: Half-peak accounting rate with US, 1993 ($US)

Australia	0.42	Luxembourg	0.48
Austria	0.48	Netherlands	0.35
Belgium	0.69	New Zealand	0.42
Denmark	0.69	Norway	0.55
Finland	0.45	Portugal	0.75
France	0.48	Spain	1.03
Germany	0.42	Sweden	0.35
Greece	0.77	Switzerland	0.50
Iceland	0.55	Turkey	0.96
Italy	0.76	UK (BT)	0.31
Japan	0.51	UK (Mercury)	0.28

Source: FCC.

5. The International Framework and National Regulations

The ITU Regulations and relevant Recommendations are quite clear with regard to the fact that distortions may arise through asymmetric accounting rates and collection charges. They have also stressed that these prices should be based on costs. This emphasis has been renewed with the adoption of Recommendation D.140 on Accounting Rate Principles for International Telephone Service. In particular

it is recognised in this Recommendation that too great a dissymmetry between charges applicable in each direction of the same relation may contribute to the distortion of the balance of traffic. As well, the International Telecommunication Regulations recognise that the charges for a given relation should be the same regardless of the route chosen by the public telecommunication operator.

The International Telecommunication Regulations do not recognise the possibility of multiple operators involved in the provision of international telecommunication services and, therefore do not provide any guidance on how to deal with such situations. In terms of refile the Regulations state (Appendix 1, in the following articles):

> "1.4 In cases where one or more routes have been established by agreement between administrations (or RPOAs) and where traffic is diverted unilaterally by the administration (or RPOA) of origin to a route which has not been agreed with the administration of destination, the terminal shares payable to the administration (or RPOA) of destination shall be the same as would have been due to it had the traffic been routed over the agreed primary route and the transit costs are borne by the administration of origin, unless the administration of destination is prepared to agree to a different share.
>
> 1.5 In cases where the traffic is routed via a transit point without authorization and/or agreement to the transit share, the transit administration (or RPOA) has the right to set the level of the transit share to be included in the international accounts."

Article 1.4 is closely linked to Article 1.1 of the Regulations. The latter states that PTOs shall establish accounting rates for a given relation and shall divide these rates into terminal shares payable to operators of terminal countries, and where appropriate transit shares. There are a number of cases which can be envisaged when PTOs breach the Regulations because of different traffic routing.

One example is shown in **Figure 1**. Country A normally sends traffic to Country B via Country E which obtains a transit share. Country D has negotiated a termination share with B that is less than A's termination share. D is willing to hub A's traffic and route it to B at a charge lower than A's payments to E and B. In this example B looses in that traffic from A is terminating at a rate lower than was negotiated, and E looses since it is no longer transitting traffic from A. According to Article 1.4, country B can claim from country A the termination share agreed for all traffic being diverted via D. E may also have claims if it made facilities available specifically to transit traffic for A. The problem would of course be to identify this traffic.

A fundamental reason for some of the requirements of the ITR is that an operator (particularly a transit operator) may make facilities available for transit, that is may also undertake investment to ensure that adequate capacity is in place to handle international transit traffic.

Where international simple resale is allowed then the possibilities to hub increase significantly and, as has been shown, there are significant differences in accounting rate shares to indicate that a number of possibilities exist for such hubbing to take place.

There seems to be only one case on public record regarding refile and this was in regard to the British Telecom Telex case in the early 1980s. Telex refilers were using BT facilities to retransmit telex messages from continental Europe to North America. Pressure from European operators on BT led the latter to suspend refile activities. A subsequent European Commission investigation [82/861/EEC] led to a ruling that retransmission of telex for 3rd parties was not in violation of CCITT Recommendations but, moreover, BT's prohibition on retransmission was contrary to Community antitrust law. The Commission also argued that ".. the maintenance of obsolete systems through measures taken by an undertaking in a dominant position is an abuse under Article 86(b) in that it limits technical development to the prejudice of consumers." There is no reason to believe that this finding would not be equally applicable to issues of refile of telephone traffic or to other alternate call procedures.

Call back services are not illegal and have not been specifically covered by national regulations mainly because their activities were not foreseen. The service providers are not based in the country where the service is taking place (the traffic originating country) and have no commercial presence in those countries. However, in many of the countries in which they provide service the provision of voice services to the public at large is a service legally reserved to the public telecommunication carrier. In the European Community the present monopoly is for real time voice communications for direct transport and switching between public switched network termination points. As such the monopoly only covers traffic originating and terminating on the PSTN which covers call back services but may exclude other types of services. In the countries were call back service providers are based they are normally able to obtain a connection within a day so that even if their initial connections were interrupted they could resume services fairly rapidly.

PTOs in both originating and terminating countries have actively tried to prevent call back operators from providing service. In Japan the three international carriers (KDD, ITJ, and IDC) have complained to the Ministry of Posts and Telecommunications that US-based call back companies were not providing any payment to Type I carriers even though they were using their circuits to transmit signals. They also argued that call back companies were depriving Japanese carriers of revenue because traffic which should be terminating in the US is originating instead in the US. Finally, it was argued that the call back operators were undermining the accounting rate system. Similarly, US carriers have argued that call back service providers are guilty of deliberately using network resources for signalling purposes without intent to pay.

Resellers normally require permission to operate. In the United States the FCC requires resellers to request authority to enter the market and identify to which countries they will provide service. In other OECD countries resellers need a licence or authority to provide service.

6. Conclusions

The key impact of the emergence of many of the alternate calling procedures is to place more attention on international telecommunication prices, pricing structures and the costs of transmitting traffic. It is also changing the traditional concept of joint provision of services and leading to the emergence of some competition in international telecommunication markets. One area where this is taking place, which has not been examined in this paper, is for transit traffic. The developments in different calling arrangements also implies that the balance of settlement minutes (and therefore settlement revenues) are becoming less useful as an indicator of traffic flows or to use in judging above cost accounting rates. There is a need for a further examination of the impact of callback practices on international traffic and traffic imbalances.

Alternate calling arrangements and developments in traffic routing are changing rapidly. Regulatory frameworks should be adjusted to take into account this new reality. In particular it may be appropriate to revisit some of the ITU Recommendations and relevant Regulations.

OECD countries have accepted the principle that telecommunication prices should be cost-oriented, in particular they have accepted this principle for accounting rates and collection charges. It is therefore very difficult to argue against the introduction of services whose primary purpose is to assist and accelerate the process of tariff rebalancing and adjusting prices toward costs. Many of the new calling procedures are not driven by competitive market forces; they are driven by the incentive provided through price distortions and arbitrage opportunities resulting from markets which are (or have been) monopoly based or have dominant players and where prices are not been based on costs. The net effect of refile and alternate calling procedures is to impose downward pressure on the prices relevant to the provision of international telephone service (collection charges and accounting rates) by arbitrating away market distortions which result from the lack of competition. These services introduce an element of competition for international telephone service. As such, refile and other alternate calling procedures might play a useful role in the market place and should not be discouraged. (It needs to be stressed that there are several OECD countries who are not in agreement to allow free rein to these alternate calling procedures).

However, there may need to be safeguards imposed in the market in particular because many of the services discussed above are provided by telecommunication operators with monopoly and dominant positions. It is their role in these new markets which may need to be monitored rather than the smaller new entrants.

ANNEX

Table A.1: Peak International Tariffs 1st January 1994, OECD countries
In $US for 1 minute based on average of 4 minutes

From/To(peak)	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Greece	Iceland	Ireland	Italy
Australia (Telstra)	0.00	1.17	1.17	0.92	1.04	1.04	1.04	1.11	1.30	1.83	0.88	0.95
Austria*	2.41	0.00	0.75	1.55	0.75	1.15	0.75	0.75	1.15	1.15	1.15	0.75
Belgium	1.45	0.58	0.00	1.02	0.58	0.72	0.48	0.48	0.62	0.96	0.58	0.58
Canada (Teleglobe/Bell)	0.92	0.99	1.13	0.00	0.85	0.85	0.74	0.98	1.45	1.01	1.01	1.18
Denmark	2.01	0.62	0.54	1.54	0.00	0.46	0.62	0.54	0.69	0.93	0.62	0.69
Finland	1.03	0.67	0.67	1.03	0.34	0.00	0.67	0.67	0.67	0.67	0.67	0.67
France	1.92	0.92	0.54	1.00	0.65	0.92	0.00	0.54	0.65	0.92	0.65	0.54
Germany	1.89	0.70	0.70	1.19	0.70	0.78	0.70	0.00	0.70	0.78	0.70	0.70
Greece	1.31	0.44	0.56	1.31	0.56	0.67	0.56	0.56	0.00	1.01	0.56	0.56
Iceland	1.77	1.02	1.02	1.17	0.69	0.72	0.81	0.69	1.17	0.00	1.02	1.17
Ireland	1.33	0.70	0.53	1.01	0.70	0.70	0.53	0.53	0.70	0.70	0.00	0.70
Italy	1.86	0.58	0.66	1.43	0.58	0.66	0.58	0.58	0.58	0.83	0.66	0.00
Japan (KDD)	2.32	2.99	2.99	2.32	2.99	2.99	2.95	2.95	2.99	2.99	2.99	2.99
Luxembourg	2.71	0.66	0.48	1.45	0.66	0.90	0.66	0.66	0.66	1.45	0.66	0.66
Netherlands	1.88	0.78	0.59	1.05	0.59	0.97	0.59	0.59	0.78	0.97	0.78	0.78
New Zealand (TCNZ)	0.68	1.38	1.38	1.31	1.38	1.38	1.38	1.38	1.52	1.52	1.38	1.38
Norway	1.29	0.65	0.65	0.87	0.34	0.34	0.65	0.65	0.65	0.65	0.65	0.65
Portugal	1.74	0.97	0.97	1.74	0.97	1.18	0.97	0.97	0.97	1.18	0.97	0.97
Spain	3.07	1.03	0.84	1.53	0.84	1.03	0.84	0.84	0.84	1.03	0.84	0.84
Sweden	1.36	0.64	0.53	0.89	0.29	0.29	0.64	0.53	0.82	0.53	0.53	0.64
Switzerland	1.22	0.68	0.68	1.02	0.68	0.68	0.68	0.68	0.95	0.95	0.95	0.68
Turkey	2.74	1.82	1.82	2.74	1.82	1.82	1.82	1.82	1.22	1.82	1.82	1.82
United Kingdom (BT)	1.03	0.65	0.49	0.65	0.49	0.65	0.49	0.49	0.49	0.86	0.45	0.49
United States (AT&T)	1.76	1.25	1.38	0.68	1.32	1.39	1.24	1.26	1.68	1.50	1.28	1.41

* Tariffs for Austria are from 1st January 1993.

Table A.1: Peak International Tariffs 1st January 1994, OECD countries
In US$ for 1 minute based on average of 4 minutes (cont'd)

From/To (peak)	Japan	Luxembourg	Netherlands	New Zealand	Norway	Portugal	Spain	Sweden	Switzerland	Turkey	U.K.	U.S.
Australia	1.17	1.30	1.04	0.71	1.04	1.30	1.43	1.04	1.17	1.30	0.88	0.88
Austria*	2.41	0.75	0.75	2.41	1.15	1.15	1.15	1.15	0.75	1.15	1.15	1.55
Belgium	1.45	0.43	0.48	1.45	0.72	0.62	0.62	0.72	0.58	0.87	0.48	1.02
Canada (Teleglobe/Bell)	1.25	1.16	0.67	0.92	0.85	1.31	1.66	0.67	0.67	1.72	0.61	0.40
Denmark	2.47	0.62	0.62	3.09	0.46	0.69	0.69	0.46	0.62	0.93	0.62	1.54
Finland	1.73	0.67	0.67	1.73	0.34	0.67	0.67	0.34	0.67	0.67	0.67	1.03
France	1.92	0.54	0.54	1.92	0.92	0.65	0.54	0.92	0.54	0.92	0.54	1.00
Germany	1.89	0.70	0.70	1.89	0.78	0.70	0.70	0.78	0.70	0.78	0.70	1.19
Greece	2.04	0.56	0.56	2.04	0.67	0.56	0.56	0.67	0.44	0.44	0.56	1.31
Iceland	2.38	1.02	0.72	2.38	0.69	1.02	0.81	0.69	1.02	1.17	0.81	1.02
Ireland	1.76	0.53	0.53	1.33	0.70	0.70	0.70	0.70	0.70	1.00	0.44	1.01
Italy	1.86	0.58	0.66	1.86	0.66	0.66	0.66	0.58	0.58	0.83	0.58	1.43
Japan (KDD)	0.00	2.99	2.99	2.34	2.99	2.99	2.99	2.99	2.99	2.99	2.95	1.89
Luxembourg	2.71	0.00	0.48	3.22	0.90	0.66	0.66	0.90	0.66	1.45	0.66	1.45
Netherlands	1.88	0.59	0.00	1.88	0.78	0.78	0.78	0.78	0.59	0.97	0.59	1.05
New Zealand (TCNZ)	1.38	1.52	1.38	0.00	1.38	1.52	1.52	1.38 I.	1.38	1.52	1.31	1.31
Norway	1.29	0.65	0.65	1.29	0.00	0.65	0.65	0.34	0.65	0.65	0.65	0.87
Portugal	2.22	0.97	0.97	2.85	1.18	0.00	0.97	1.18	0.97	1.18	0.97	1.74
Spain	3.07	0.84	0.84	3.07	1.03	0.84	0.00	1.03	1.03	1.03	0.84	1.53
Sweden	1.77	0.64	0.53	1.36	0.29	0.82	0.82	0.00	0.64	0.82	0.53	0.89
Switzerland	1.62	0.68	0.61	2.17	0.68	0.95	0.95	0.68	0.00	0.95	0.54	1.02
Turkey	2.74	1.82	1.82	2.74	1.82	1.82	1.82	1.82	1.82	0.00	1.82	2.74
United Kingdom (BT)	1.65	0.49	0.49	1.03	0.65	0.49	0.49	0.65	0.49	0.86	0.00	0.65
United States (AT&T)	1.69	1.39	1.23	2.11	1.24	1.57	1.52	1.20	1.36	1.76	1.08	0.00

* Tariffs for Austria are from 1st January 1993.

Table A.2: Cheap International Tariffs 1st January 1994, OECD countries
In US$ for 1 minute based on average of 4 minutes

From/To (peak)	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Greece	Iceland	Ireland	Italy
Australia (Telstra)	0.00	1.17	0.84	0.70	0.78	0.78	0.78	0.76	1.30	1.83	0.67	0.67
Austria*	2.41	0.00	0.57	1.55	0.57	0.75	0.57	0.57	0.75	0.75	0.75	0.57
Belgium	1.45	0.51	0.00	0.87	0.51	0.62	0.43	0.43	0.54	0.72	0.51	0.51
Canada (Teleglobe/Bell)	0.69	0.74	0.85	0.00	0.65	0.65	0.56	0.73	1.09	0.76	0.76	0.88
Denmark	2.01	0.62	0.54	1.54	0.00	0.46	0.62	0.54	0.69	0.93	0.62	0.69
Finland	0.77	0.49	0.49	0.77	0.25	0.00	0.49	0.49	0.49	0.49	0.49	0.49
France	1.59	0.65	0.45	0.74	0.45	0.65	0.00	0.45	0.45	0.65	0.45	0.45
Germany	1.89	0.52	0.52	1.19	0.52	0.78	0.52	0.00	0.52	0.78	0.52	0.52
Greece	0.98	0.33	0.42	0.98	0.42	0.50	0.42	0.42	0.00	0.75	0.42	0.42
Iceland	1.33	0.77	0.77	0.87	0.52	0.55	0.61	0.52	0.87	0.00	0.77	0.87
Ireland	1.02	0.53	0.47	0.78	0.53	0.53	0.47	0.47	0.53	0.53	0.00	0.53
Italy	1.47	0.46	0.53	1.28	0.46	0.53	0.46	0.46	0.46	0.66	0.53	0.00
Japan (KDD)	1.37	1.80	1.80	1.37	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Luxembourg	2.71	0.54	0.42	0.96	0.54	0.90	0.54	0.54	0.54	0.96	0.54	0.54
Netherlands	1.62	0.54	0.43	0.92	0.43	0.65	0.43	0.43	0.54	0.65	0.54	0.54
New Zealand (TCNZ)	0.23	0.76	0.76	0.50	0.50	0.50	0.50	0.50	0.84	0.84	0.63	0.76
Norway	1.29	0.52	0.52	0.69	0.27	0.27	0.52	0.52	0.52	0.52	0.52	0.52
Portugal	1.18	0.74	0.74	1.18	0.74	0.91	0.74	0.74	0.74	0.91	0.74	0.74
Spain	2.16	0.71	0.58	1.06	0.58	0.71	0.58	0.58	0.58	0.71	0.58	0.58
Sweden	1.36	0.64	0.53	0.89	0.29	0.29	0.64	0.53	0.82	0.53	0.53	0.64
Switzerland	1.22	0.54	0.54	0.81	0.54	0.54	0.54	0.54	0.68	0.68	0.68	0.54
Turkey	2.43	1.22	1.22	2.43	1.22	1.22	1.22	1.22	0.91	1.22	1.22	1.22
United Kingdom (BT)	0.85	0.55	0.38	0.60	0.38	0.55	0.38	0.38	0.38	0.73	0.35	0.38
United States (AT&T)	1.04	0.79	0.82	0.26	0.81	0.86	0.79	0.81	1.00	0.90	0.85	0.88

* Tariffs for Austria are from 1st January 1993.

Table A.2: Cheap International Tariffs 1st January 1994, OECD countries
In US$ for 1 minute based on average of 4 minutes (cont'd)

From/To (peak)	Japan	Luxembourg	Netherlands	New Zealand	Norway	Portugal	Spain	Sweden	Switzerland	Turkey	U.K.	U.S.
Australia (Telstra)	0.91	1.30	0.78	0.47	0.78	1.30	1.43	0.78	1.17	1.30	0.67	0.67
Austria*	2.41	0.57	0.57	2.41	0.75	0.75	0.75	0.75	0.57	0.75	0.75	1.55
Belgium	1.45	0.32	0.43	0.00	0.62	0.54	0.54	0.62	0.51	0.72	0.43	0.87
Canada (Teleglobe/Bell)	0.93	0.87	0.51	0.69	0.65	0.99	1.25	0.51	0.51	1.29	0.46	0.16
Denmark	2.47	0.62	0.62	3.09	0.46	0.69	0.69	0.46	0.62	0.93	0.62	1.23
Finland	1.73	0.49	0.49	1.73	0.25	0.49	0.49	0.25	0.49	0.49	0.49	0.77
France	1.59	0.45	0.45	1.59	0.65	0.45	0.45	0.65	0.45	0.65	0.45	0.74
Germany	1.89	0.52	0.52	1.89	0.78	0.52	0.52	0.78	0.52	0.78	0.52	1.19
Greece	1.53	0.42	0.42	1.53	0.50	0.42	0.42	0.50	0.33	0.33	0.42	0.98
Iceland	1.79	0.77	0.55	1.79	0.52	0.77	0.61	0.52	0.77	0.87	0.61	0.77
Ireland	1.76	0.47	0.47	1.02	0.53	0.53	0.53	0.53	0.53	0.85	0.34	0.78
Italy	1.47	0.46	0.53	1.47	0.53	0.53	0.53	0.46	0.46	0.66	0.46	1.28
Japan (KDD)	0.00	1.80	1.80	1.39	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.19
Luxembourg	2.71	0.00	0.42	3.22	0.90	0.54	0.54	0.90	0.54	1.45	0.54	0.96
Netherlands	1.62	0.43	0.00	1.62	0.54	0.54	0.54	0.54	0.43	0.97	0.43	0.92
New Zealand (TCNZ)	0.50	0.84	0.50	0.00	0.50	0.84	0.84	0.50	0.76	0.84	0.50	0.50
Norway	1.29	0.52	0.52	1.29	0.00	0.52	0.52	0.27	0.52	0.52	0.52	0.82
Portugal	1.48	0.74	0.74	2.00	0.91	0.00	0.74	0.91	0.74	0.91	0.74	1.18
Spain	2.16	0.58	0.58	2.16	0.71	0.58	0.00	0.71	0.71	0.71	0.58	1.06
Sweden	1.77	0.64	0.53	1.36	0.29	0.82	0.82	0.00	0.64	0.82	0.53	0.89
Switzerland	1.62	0.54	0.47	2.17	0.54	0.68	0.68	0.54	0.00	0.68	0.44	0.81
Turkey	2.43	1.22	1.22	2.43	1.22	1.22	1.22	1.22	1.22	0.00	1.22	2.43
United Kingdom (BT)	1.57	0.38	0.38	0.60	0.55	0.38	0.38	0.55	0.38	0.73	0.00	0.60
United States (AT&T)	1.15	0.87	0.79	1.27	0.76	0.94	0.96	0.74	0.81	1.08	0.71	0.00

* Tariffs for Austria are from 1st January 1993.

Table A.3: National Tariffs 1st January 1994, EC countries
In US$ for 1 minute based on average of 4 minutes

From/To(peak)	Belgium	Denmark	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	U.K.
Belgium	0.00	0.58	0.48	0.48	0.62	0.58	0.58	0.43	0.48	0.62	0.62	0.48
Denmark	0.54	0.00	0.62	0.54	0.69	0.62	0.69	0.62	0.62	0.69	0.69	0.62
France	0.54	0.65	0.00	0.54	0.65	0.65	0.54	0.54	0.54	0.65	0.54	0.54
Germany	0.70	0.70	0.70	0.00	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Greece	0.56	0.56	0.56	0.56	0.00	0.56	0.56	0.56	0.56	0.56	0.56	0.56
Ireland	0.53	0.70	0.53	0.53	0.70	0.00	0.70	0.53	0.53	0.70	0.70	0.44
Italy	0.66	0.58	0.58	0.58	0.58	0.66	0.00	0.58	0.66	0.66	0.66	0.58
Luxembourg	0.48	0.66	0.66	0.66	0.66	0.66	0.66	0.00	0.48	0.66	0.66	0.66
Netherlands	0.59	0.59	0.59	0.59	0.78	0.78	0.78	0.59	0.00	0.78	0.78	0.59
Portugal	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.00	0.97	0.97
Spain	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.00	0.84
United Kingdom (BT)	0.49	0.49	0.49	0.49	0.49	0.45	0.49	0.49	0.49	0.49	0.49	0.00

NOTES

1. Bernard, K., *Global Network Developments: A Regulatory Challenge*, Presented at Columbia University, Columbia Institute for Tele-Information (1993).

2. National Telecommunication and Information Administration, Comprehensive Examination of U.S. Regulation of International telecommunications Services, Docket No. 921251-2351.

3. See Tele Danmark, *Share Prospectus 1994*, page 28.