UNIVERSAL SERVICE OBLIGATIONS IN A COMPETITIVE TELECOMMUNICATIONS ENVIRONMENT
UNIVERSAL SERVICE OBLIGATIONS IN A COMPETITIVE TELECOMMUNICATIONS ENVIRONMENT
ORGANISATION FOR ECONOMIC CO-OPERATION
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FOREWORD

The liberalisation of telecommunication service markets has focused the attention of policy-makers on whether universal service objectives can be met in a competitive environment. This report examines the process and procedures for achieving these objectives in a cost-effective way.

The Committee on Information, Computer and Communications Policy recommended that this report be made available to the public. The report was prepared by Mr. Patrick Xavier (Swinburne University of Technology, Australia) and Chapter V was prepared by Professor Martin Cave (Brunel University, United Kingdom). It is published on the responsibility of the Secretary-General of the OECD.
EXECUTIVE SUMMARY

Many public enterprises including transport, postal, energy and water authorities have long been required by government to undertake activities which they would not engage in if guided strictly by commercial considerations. These non-commercial activities are usually directed to a government's social, industrial or developmental objectives.

Telecommunication operators in many countries have also been required to serve such government objectives. Usually these universal service obligations constitute a requirement to provide basic telephone service to all who request it at a uniform price even though there may be significant differences in the costs of supply.

In addition to such universal service obligations, telecommunication operators have also frequently been expected -- or expressly required -- to provide other non-commercial services and charge uneconomic prices to some subscribers in order to serve community service objectives.

This report is less concerned with debating the appropriateness of universal service and other non-commercial objectives, but concerned rather with the process and procedure for achieving those objectives -- where deemed appropriate -- in a cost effective way.

The traditional means of funding non-profitable universal service activities is by cross-subsidisation. Recent rapid changes in telecommunication technology and policy which have liberalised markets in an increasing number of countries have given rise to concerns about the sustainability of universal service policies based on cross-subsidisation. This has contributed to the widespread belief that the tide of deregulatory change permitting rapidly increasing competition poses a significant threat to universal service. Moreover, this argument has been exploited by public operators as a means of preserving their monopoly position. In some countries, this concern over the threat to universal service is a central factor impeding market liberalisation to permit competition. Since competition can yield significant benefits for at least some aspects of universal service, prohibiting competition could serve, in fact, to impede progress towards universal service. While some effects of competition
may impact unfavourably on the "affordability" of the telephone service, this
does not mean that competition has to be prohibited. As this report indicates,
there are various ways of addressing these problems (using mechanisms that are
far more cost-effective than cross-subsidisation) so that the pursuit of universal
service objectives can be maintained in a competitive environment. For
example, funds to support universal service schemes can come from taxation
revenue, levies on telecommunication users, or from operators. It is important
that support mechanisms are carefully structured and narrowly targeted so as not
to impede pro-competition policies.

The primary conclusion of this study, therefore, is that competition
and the achievement of universal service objectives are not mutually exclusive
nor necessarily in conflict. With appropriate arrangements in place, competition
rather than monopoly may still be the more appropriate structure to ensure the
maintenance -- or expansion -- of universal service objectives and targets. What
this suggests is that rather than find expression in attempts to impede
competition, the concern over universal service could be more constructively
harnessed and directed towards the design and installation of such appropriate
arrangements as are necessary for the preservation of universal service in a
competitive environment.

These considerations have guided this report to its underlying aim,
which is that of assisting in the task of developing such policies and
programmes for the provision and funding of universal service. It seeks to do so
by providing a framework and set of principles for (re)considering the
identification, costing, funding, reporting and monitoring of universal
service which is applicable to OECD countries. Such a framework and set of
principles may assist the development of a more broadly consistent approach to
universal service by OECD countries. This consistency of approach is
important since, with the likelihood of an increasing globalisation of
telecommunication markets, there will be a greater need to forge common
principles for the development and achievement of universal service objectives
and programmes.

The principles proposed are as follows:

a) articulate universal service objectives and coverage clearly and
specifically;

b) identify barriers to universal service;
c) identify schemes which could cost-effectively address the identified barriers to universal service;

d) estimate the cost of universal service programmes;

e) consider the relative merits of alternative mechanisms for funding universal service;

f) report progress in achieving universal service targets regularly and publicly;

g) monitor and evaluate performance in universal service delivery regularly.
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I. INTRODUCTION

1. Introduction

Many public enterprises including transport, postal, energy and water authorities have long been required by government to undertake activities which they would not engage in if guided strictly by commercial considerations. These non-commercial activities -- variously referred to as “Community Service Obligations”, “Public Service Obligations” or “Social Objectives” -- are usually directed to a government's social, industrial or developmental objectives.

Whatever the terminology used, it appears that these non-commercial objectives can be classified into two broad categories. First, there are cases where governments consider it desirable that certain services should be supplied to final consumers or industry at a uniform or an “affordable” price irrespective of the cost of provision. Examples are the provision of electricity, transport and postal services to isolated regions. Second, public enterprises implement welfare and redistribution policies by granting price concessions to consumers who are deemed to be in need of some form of social support.

Both categories of services are supplied by enterprises at the explicit or implicit direction of government. They are services which the enterprise would not provide to the community at large or to a specific geographic area at that price if strictly commercial criteria applied.

Telecommunication operators in many countries have also been required to serve such government objectives. The so-called “Universal Service Obligations” of telecommunication operators, which has been a common feature of telecommunication regulation in most countries, is an example of such a requirement. Usually these obligations constitute a requirement to provide basic telephone service to all who request it at a uniform and affordable price even though there may be significant differences in the costs of supply.

In addition to such universal service obligations, telecommunication operators have also frequently been expected -- or expressly required -- to provide other non-commercial services and charge uneconomic prices to some
subscribers in order to serve community service objectives. For instance, in the United Kingdom, BT's license requires it to provide various services, including:

-- directory enquiries for the blind and disabled;
-- emergency services;
-- public call boxes;
-- supply of apparatus for the disabled;
-- special telephones for those with impaired hearing; and
-- adaptation of public call boxes for the hearing-impaired.

To provide another example, Australia's Telecommunications Act 1991 contains “prescribed carrier obligations” concerning not only the traditional “universal service obligation” to ensure that the standard telephone service and payphones are available to all Australians, but also other obligations, such as the obligation that general carriers give all residential customers the option of having untimed local calls (that is, where the charge for a local call is unrelated to the duration of the call).

While there is no doubt that there is a need for each country to re-examine the rationale and continuing relevance of universal service objectives, this report is less concerned with debating the appropriateness of such objectives, but concerned rather with the process and procedure for achieving -- in a cost effective way -- those universal service objectives deemed by government to be appropriate.

The traditional means of funding universal service activities is by cross-subsidisation. This is a practice whereby the losses incurred on some activities are financed by income earned on other profitable activities engaged in by the enterprise. Moreover, in some countries, telecommunication revenue is used to cross-subsidise postal services. Such cross-subsidisation can be maintained while the high prices relative to costs, and consequently high profits earned on some services, are preserved through the (public) telecommunication operator's protected monopoly position.

Recent rapid changes in telecommunication technology and policy which have liberalised markets in an increasing number of countries have given rise to concerns about the sustainability of universal service policies based on cross-subsidisation. Naturally, competition will strike most enthusiastically and effectively at the incumbent operator's high profit service areas which are the services generating the funds supporting cross-subsidisation. Unless prices are reduced and/or rebalanced to competitive levels, the incumbent operator is vulnerable. But the price reduction for high profit services will erode the funds
to sustain cross-subsidies for universal service. This has contributed to the widespread belief that the tide of deregulatory change permitting rapidly increasing competition poses a significant threat to universal service. Moreover, this argument has been exploited by public operators as a means of preserving their monopoly position. Clearly in countries where cost-orientation has been implemented within a monopoly market, new entry will have less significant price effects.

In some countries, this concern over the threat to universal service is a central factor impeding market liberalisation to permit competition.

Impeding competition, however, results in stemming the potential flow of benefits which can emanate from effective competition. As this report evidences, competition can assist in achieving universal service objectives: by spurring innovative services and enhancing choice; by reducing costs and prices; and by improving quality of service. Since competition can yield significant benefits for at least some aspects of universal service, prohibiting competition could serve, in fact, to impede progress towards universal service.

It is true, however, that some effects of competition may impact unfavourably on the “affordability” of the telephone service. One reason why this could happen is the acceleration of price rebalancing which will result from competitive pressures. As detailed in the report, price rebalancing towards cost-based charges, while reducing charges on long-distance calls, will result in price increases on local telephone connection and usage. But because competition may result in some problems for universal service does not mean that competition has to be prohibited. As the report indicates, there are various ways of addressing these problems (using mechanisms that are far more cost-effective than cross-subsidisation) so that the pursuit of universal service objectives can be maintained (or even enhanced) in a competitive environment. Examples of the successful use of such mechanisms drawn from various countries -- particularly those with already liberalised markets -- are noted.

In other words, with appropriate arrangements in place, competition rather than monopoly may still be the more appropriate structure to ensure the maintenance -- or, indeed, if desired, expansion -- of universal service objectives and targets. Competition and universal service need not be mutually exclusive or necessarily in conflict. What this suggests is that, rather than find expression in attempts to impede competition, the concern over universal service could be more constructively harnessed and directed towards the design and installation of such appropriate arrangements as are necessary for the preservation of universal service in a competitive environment.
Indeed, the prospect of competition and the concerns this is raising is providing an exceptional opportunity for a long-overdue reconsideration of universal service objectives and a review of policies and programmes to achieve these objectives. Moreover, the perceived threat to universal service has probably engendered a political climate receptive to efforts to embed through legislation, or in the licence contracts bestowed on operators, policies and programmes which would ensure the efficient and equitable delivery of universal service.

Even where market liberalisation is not intended, a clearer definition of the objectives and programmes for achieving universal service allows such objectives to be explicitly acknowledged and costed. Indeed, this type of information has become necessary in view of the widespread trend towards corporatisation and the quest for improved performance monitoring and encouragement of telecommunication operators. Where universal service activities are not specified and costed so that they can be taken into account in performance assessment, they can provide a cloak behind which inefficiency and ineffectiveness can hide.

These considerations have guided this report to its underlying aim, which is that of assisting in the task of developing such policies and programmes for the provision and funding of universal service. It seeks to do so by providing a framework and set of principles for (re)considering the identification, costing, funding, reporting and monitoring of universal service which is applicable to OECD countries. Such a framework and set of principles may assist the development of a more broadly consistent approach to universal service by OECD countries. This consistency of approach is important since, with the likelihood of an increasing globalisation of telecommunication markets, there will be a greater need to forge common principles for the development and achievement of universal service objectives and programmes.

Of course, a more consistent approach does not mean that a uniform position on universal service targets, policies, etc., is necessary. Each national situation is unique and no single strategy for delivering universal service can be designed for general application. Thus, it is to be expected that the specific objectives, targets, policies and pace of implementation determined within the boundaries of the proposed principles might vary from country to country according to national circumstances and priorities.
2. **Structure of report**

Following this introductory chapter, Chapter II of the report examines the concept and rationale of universal telecommunication service. To assist in the pivotal task of clarifying objectives and operational targets for universal service, the chapter proposes that the concept of universal service be disaggregated into several distinct categories including: universal geographic access; universal affordable access; universal service quality; universal access by the disabled; and tariffs for universal service.

Chapter II also raises the question of how the new telecommunication services should be treated in regard to the definition of universal service. The answer to this question has important implications for small business as well as residential subscribers.

Chapter III then addresses the concerns about the impact of telecommunication market liberalisation on universal service. The chapter considers how competition is likely to impact on each of the factors which affect universal service including: telephone call prices; connection charges; rental charges; deposit requirements; quality of service; disconnection; assistance to the disabled; and efforts to address the factors influencing voluntary non-subscription to the telephone service. To assess the arguments in regard to the impacts of liberalisation on universal service, evidence drawn from the experience of countries which have already liberalised their telecommunication markets is examined. These countries include the United States, United Kingdom, Japan, New Zealand and Australia. Chapter III concludes that, while in some respects a competitive situation could benefit universal service, in other respects it might accentuate the problems of rural, low income, and disabled groups in affording telecommunication access and usage.

Chapter IV deals with the task of identifying appropriate mechanisms to address these problems so as to enable universal service objectives to continue to be pursued in a competitive environment. The chapter commences by indicating alternative mechanisms for delivering universal service, then proposes criteria for assessing the merits of these mechanisms. Drawing significantly on the practices of various OECD countries, schemes to address barriers to universal service -- including the efforts of regulatory agencies -- are discussed. The chapter then proceeds to discuss an example of an arrangement to share the costs of providing universal service in a competitive environment.

Of course, if the cost of providing universal service is to be shared, there is a need to know what this cost is. Unless this cost is known, it cannot be
apportioned. This task of estimating the cost of universal service is examined in Chapter V. The task is not a straightforward one because there are problems of methodology as well as of measurement. But determining the cost of universal service is obviously important, and the task needs to be confronted even where competition is not envisaged. This is because such information is necessary if the cost of supporting universal service programmes is to be taken into account when assessing a telecommunication operator's economic and commercial performance. But, to reiterate, the issue of determining the costs of universal service becomes even more complex where the responsibility of universal service is to be shared, e.g. among competitors.

Finally, Chapter VI presents the conclusions of the report. In particular, the chapter draws together the threads of the previous chapters to suggest a design for an operational programme for delivering universal service within a competitive environment. The important tasks of reporting, monitoring and evaluating progress in universal service delivery are also discussed.
II. THE CONCEPT AND RATIONALE OF UNIVERSAL SERVICE OBLIGATIONS IN TELECOMMUNICATIONS

1. Introduction

This chapter is concerned with the primary task in developing an operational programme for ensuring that universal service objectives are met -- that of arriving at a clear and specific articulation of universal service requirements. The chapter discusses firstly why a clear specification of universal service is necessary. It then examines the ways in which the concept of universal service has been interpreted and implemented. Even where the concern for universal service is limited to “basic” telephone service, there are considerable variations in the way universal service is defined, partly because of the stage of development of a country's telephone system. Moreover, the concept of a basic service has changed significantly over the years. The clearest example of the concept's evolution is the case of the United States where, since the telephone was introduced, the concept of the “basic” telephone service appears to have evolved from the cord switchboards and party lines of the early 1900s to the current view that a widespread availability of touch-tone telephones should be the “standard” offering. With a plethora of new telephone services available and many more in prospect, an unavoidable issue in a study of universal service is how these new services are to be treated in the context of the concern for universal service. Another task undertaken in this chapter is to explore for some of the principles which could guide a consideration of this important question, now a pressing one for countries with advanced telecommunication systems (such as the United States), but in time to be faced by other countries as well.

2. The need for a specific definition of universal service

Universal service requirements have seldom been explicitly and specifically articulated whether for a monopoly or a competitive situation. Even where explicitly required by legislation, universal service obligations have been
vaguely specified in terms of the nature, extent, and standard of services required.

An example of this lack of specific identification of universal service obligations is provided in the Australian 1989 telecommunications legislation (now superseded by the 1991 legislation). Under this legislation, Telecom Australia's universal service obligation was the provision of a "standard telephone service" which is further defined as the "public switched telephone service". In providing that service, Telecom Australia was to ensure that, in view of the social importance of the service, it is reasonably accessible to all persons in Australia on an equitable basis, wherever they reside or carry on business and that the performance standards of the service reasonably meet the social, industrial and commercial needs of the Australian community.

The ambiguous specification (and sometimes lack of any specification) of universal service requirements usually meant that it was largely left to the telecommunication operator to define by itself the specific requirements of the universal service objective, set targets for meeting these objectives, and decide on how, and how quickly, these targets were to be achieved. In many cases, operators were also left to make their own assessment of whether they were meeting their own perceived mandate regarding universal service.

Not surprisingly, these circumstances made it difficult to assess whether the delivery of universal service by the telecommunication operator was consistent with government objectives and policies. Moreover, since universal service activities were funded by undisclosed cross-subsidies, the cost of these activities lacked transparency. The lack of specific objectives and cost estimates also meant that it was difficult to assess the cost-effectiveness of universal service programmes.

The loose specification of universal service obligations permitted considerable room for alterations and reinterpretation by government, making universal service programmes vulnerable to overt or covert political pressures rather than being based on a clear and sustained strategy.

Taken together, these circumstances resulted in a lack of transparency and accountability in the delivery of universal service which allowed the operator to use the universal service obligations placed upon it as an excuse for poor economic or commercial performance.

These observations of the problems which result from an ambiguous specification of government objectives required of government-owned
enterprises are not new. Indeed, the OECD itself has raised such concerns in an earlier report (OECD, 1987):

“There is extensive empirical evidence that the objectives public enterprises are expected to pursue are often poorly set out, and that even when set out, they are extensively altered and reinterpreted through political processes of negotiation; while this may be useful in some circumstances, it frequently gives rise to inconsistent requirements being placed upon the enterprise...unclear and conflicting objectives make performance difficult to define and monitor and compound the problems created by the lack of any ongoing external assessment. In some cases, this leads to public enterprises being subject to little effective control (as has sometimes happened in France) or to detailed administrative requirements aimed at ex-ante supervision of procedures and decisions (as has happened at times in Australia)...Overall, the problems of public enterprise arise partly from the fact that the ‘regulatory contract’ between the State and a publicly owned operator of a public utility is a highly implicit one, where the primary guarantee given to consumers is often a purely negative one -- monopoly profits will not be maximised...” (p. 305-306)

There is now probably an even more pressing need than before for clearly and specifically defined universal service obligations whether or not telecommunication market liberalisation is intended. In countries where liberalisation is not intended, such an explicit specification of universal service goals would facilitate the task of monitoring commercial and economic performance. This is because the cost the operator incurs in pursuing the universal service objectives required of it can then be made more transparent and can therefore be more readily allowed for in performance assessment.

But a clear and specific articulation of universal service requirements is especially important for those countries in which telecommunication operators are increasingly shedding their public service orientation and bracing themselves to meet the demands of corporatisation or the new competitive circumstances which already exist in some countries. In such circumstances, it should be made clear to operators what their obligations are in regard to universal service provision. Such clear specification of obligations is especially important if it is true (as some have contended) that telecommunication operators in a competitive environment would be less inclined to maintain unprofitable universal service activities. Clearly, vaguely specified obligations will make it easier for operators to abandon or curtail them.
This means that if universal service is to be preserved, its pursuit must be based on deliberately instituted and explicitly articulated targets and policies for achieving them. Again, the successful implementation of such a process to preserve (or, indeed, if desired, expand) universal service must be based on a specific definition of what the universal service obligation constitutes -- including the conditions under which assistance would be made available -- both to the telecommunication operator and to the public.

Such an explicit specification of universal service goals and targets should not constitute a threat to those who stand to benefit from universal service. Indeed, it would help ensure that despite the emergent competitive pressures, the universal service objective is nonetheless operationalised in terms of distinct, realisable, and measurable targets which telecommunication operators can be held accountable for delivering.

3. The concept of universal service in telecommunications

Basically, the concept of universal service obligations involves making the telecommunication network available for “basic” telephony to those households or firms which wish to make use of it. The underlying value judgement supporting this concept of universal service is that “basic” telecommunication services are an essential requirement for citizens in their daily life and that they should have the possibility of access to such services.

For many years there was little doubt that the service which was “essential” was access to the public switched telecommunication network and the ability to make and receive local calls. This is still the case for most developing countries and many OECD countries. However, with the dramatic developments in telecommunications in some countries (such as the United States) with a profusion of sophisticated new services already available and many more in prospect, the question of what constitutes a basic service in an increasingly information based society, is no longer so simply answered. This is an issue examined shortly. For now, the discussion of universal service assumes that the service in question is access to the basic “plain old telephone service” sometimes referred to as POTS.

There appear to be three major perspectives of the concept of universal service:

-- access to the telecommunication network at postalised (geographically averaged) prices;
-- access to the network at subsidised prices (for all or some parts of
the population); and

-- access to the network for all who require it but at prices which are
cost-based.

In a number of countries the practice has been to set connection and
rental charges at the same level throughout a country (geographically averaged)
irrespective of whether the costs of installing telephone main lines differed
between regions. This form of access to the network at postalised prices
required cross-subsidisation between geographic areas (urban to rural) and may
also require subsidies from telephone call revenues to connection costs.

Connection and rental charges are not the only components of a
telecommunication bill faced by subscribers, of course. The other major
component is call charges related to usage. There is clearly also a widespread
concern over the level of usage prices.

Concern over the level of usage prices is not generally specifically
covered by definitions of universal service requirements. Nevertheless, this
concern seems reflected in the regulatory controls and in the pricing policies of
telecommunication operators in many countries, although practices have varied
from country to country. In Australia, the “prescribed carrier obligations” under
the Telecommunications Act 1991 require general carriers to give all residential
customers the option of having untimed local calls (that is, where the charge for
a local call is unrelated to the duration of the call). In the United Kingdom,
United States and Australia, the RPI-X formula for regulating price increases is
another manifestation of the concern with the overall telecommunication bill,
i.e. including the level of usage prices. The use in the United Kingdom of
controls over the rate of increase in the “median” or typical subscriber's bill is
yet another.

The pricing policies adopted in many countries also reflect a concern
over prices. A common practice in telecommunications has been to subsidise
the price of local calls through higher long-distance call charges. Moreover,
differences in the size of charging zones have also implied discriminatory usage
pricing conditions in terms of the geographic coverage that could be attained for
the price of a local call. (In effect, in terms of the number of people that could
be reached for the price of a local call, residential customers in large cities were
better off than those in sparsely populated areas.)
In New Zealand, the privatised Telecom Corporation was required by the Government to make “pledges” which provide the following commitments:

-- local free calling will remain a tariff option available to all residential customers;

-- the Standard Residential Rental for a phone line will not rise faster than movements in the Consumer Price Index unless the profits of Telecom's Regional Operating Companies are unreasonably impaired;

-- phone line rentals for residential customers in rural areas will not be higher than in the cities, and the residential service will remain as widely available as it is at present.

There may be dispute, however, over the extent to which concern about prices for usage of the telecommunication network comes under the purview of universal service concerns. Some may consider that connection to the network is sufficient to meet the concerns which have driven governments to mandate universal service requirements. But since most people seek connection to the network to make (and receive calls), the level of usage prices can clearly affect subscribership, either in deterring the decision to subscribe, or in affecting the ability to sustain subscribership.

This issue is of course for government to decide upon. A minimalist approach would be to be concerned only with connection so that the telephone can be used as a lifeline to make and receive a few emergency calls. A broader concern would embrace the overall affordability of the telecommunication service covering its connection, rental and call components.

Another way of perceiving universal service is in terms of the provision of access below cost on a general basis. This form of access requires that subscription and usage charges are cross-subsidised from other service areas (usually long-distance call charges). A variant of such a policy is to discriminate positively in favour of eligible lower income groups by providing them with subsidised access. As detailed in the report later, there are a number of ways through which this could be done. For example, in the United States, assistance for lower income households for telephone service (lifeline programmes) is funded through charges paid by inter-state ratepayers, that is through cross-subsidisation within the telephone system. Other programmes are provided to offset installation charges (the “Link-up America” programme).
The provision of the telephone service to all who require it but at prices which are cost-based, could also be considered a form of universal service. Here the stress is laid on making available telephone service in all areas throughout a nation irrespective of cost.

Universal access leaves open the question of the technology employed to provide the service. It may be desirable on cost grounds in some locations to provide service by radio or VSAT, rather than by fixed links. This means that not all subscribers have access to the same service quality, although minimum standards must be met for all. It would not be discriminatory if one technology -- by virtue, perhaps of offering services other than basic telephony -- offered a higher quality of service than another, provided that both reached agreed minimum levels.

Universal service obligations take on real “bite” when the concept of access at reasonable cost and affordable price is introduced. Certainly this is the stance that community welfare and consumer advocates would take. Their view is typified in a Victorian Council of Social Services submission made to a Parliamentary inquiry (Victorian Parliament (Australia), Economic and Budget Review Committee, 1991, p.100) into Community Service Obligations (a term which encompasses universal service obligations):

“People have a right to essential services regardless of where they live or their ability to pay. Government Business Enterprises have an obligation to take into account structural inequities which restrict access by some groups to essential services. Low income people will be disproportionately affected by price changes. Aboriginal and non-English speaking background people face cultural and language barriers to accessing essential services. People with a disability may have difficulties in physically accessing services. Rural people should not be disadvantaged by lack of access or pricing of essential services. Ensuring these groups gain access to essential services is a fundamental Community Service Obligation.”

Consumer advocates would argue that their position is partly justified by the benefits of universal service which they complain is seldom referred to in discussions of universal service (certainly not as much as the costs of universal service are, at any rate!). As Raiche (1991, p.3) put it:

“We also do not know enough about the benefits of ensuring reasonable access of all Australians to a telephone service. How much is saved because an unemployed person has access to a phone and
therefore a far better chance of finding employment -- and coming off the dole? How much is saved because elderly people or people with disabilities have access to a telephone and therefore can lead independent lives, living on their own rather than being institutionalised and an economic burden on the state? Recent work done by Ann Moyal on women's use of the telephone highlights the important role the telephone plays. It is used as a transport substitute. For migrant women, it is used as part of their acculturation process. It is a vital link for both families and communities.”

If the definition of affordability and reasonable cost in a universal service context is the level of prices required to attain a high penetration rate, then universal service, thus defined, carries with it important implications for the relative prices charged for telecommunication services and the profitability of the network operator.

What is affordable and at reasonable cost for a household may differ from what is affordable and at reasonable cost for a business. In many countries, business subscribers are charged higher rates for access than domestic customers, although each category faces the same charges independently of the actual cost of providing service. Of course, the higher telephone charges on business will be passed on by way of higher prices for goods and services, so that the final redistributional effects of the cross-subsidisation are uncertain. The achievement of social objectives by keeping down residential tariffs through higher business tariffs is thus indirect and problematical.

Drawing together the threads of the preceding paragraphs, a preliminary characterisation of universal service obligations can be arrived at. They may be regarded as obligations imposed upon the telecommunication operator to provide basic telephone service over some specified area at prices which are either uniform or, if not uniform, do not fully reflect differences in the cost of service. In many cases this will involve, in addition to uniform or near uniform pricing, implicit or explicit constraints on the relative prices the operator can charge for particular services, in particular a tendency to impose a ceiling upon access charges. Changes in the relative prices of different services thus affect (and may be affected by) the costs of universal service. (For an analysis of such changes, see OECD, 1991, Part II.)

The discussion of the component dimensions of universal service undertaken below will provide further explanation of the nature of universal service. This discussion will also provide the background for setting operational
universal service targets. Before doing so, however, it is instructive to consider the rationale of universal service.

4. The rationale of universal service

As observed earlier, the provision of universal service is usually discussed in relation to the provision of a "basic" telephone service. Hence the question of precisely what is covered within this concept of a basic telephone service is obviously an important one for this study. But it turns out that determining how this basic service should be defined is no straightforward matter.

When the history of the evolution of telecommunication network technology is considered, it soon becomes evident that the definition of "basic" telephone service has also been an evolving one. Table II.1 sets out the evolution of the "basic telephone service" concept in the case of the United States. As detailed in the table, when dial central offices replaced manual switchboards, "basic" service was redefined to embrace this new mechanised call-setup and signalling technology. The introduction of direct distance dialling in the 1960s similarly changed the character of basic telephone service, and evolved into the 1980s deployment of international direct distance dialling (IDD) and "equal access" arrangements for multiple interexchange carriers. Technological changes have brought down the costs of usage and minimised the distance-sensitivity of usage costs. This has encouraged the expansion of local calling areas and the incorporation of extended area service as part of basic service. New technology has also allowed the definition of basic telephone service to be expanded to meet new social goals. Introduction of public safety communication systems (9-1-1 and Enhanced 9-1-1) and TDD/voice relay systems for the speech and hearing impaired population are examples of this development.

In some cases, a new network function does not immediately result in a redefinition of "basic" service, but is merely offered as a "premium" add-on to the pre-existing basic telecommunication capability. For example, when touch-tone signalling was introduced in the United States in the mid-1960s, it was treated as a "premium" service for which an additional fee was charged. However, in recent years, touch-tone has been included within the scope of basic service in a growing number of telephone jurisdictions in the United States (NRRI, 1991).
But there have been cases too where the definition and scope of "basic" telephone service has actually been narrowed. In some instances, the contraction of the basic service definition has occurred largely at the instigation of the telephone companies as a means of increasing revenue. The introduction of separate charges for operator services, directory assistance, special number assignment, and time-measured charges for local calling fall within this category. In other instances, the contraction of the basic service definition happened in connection with changes in regulatory policy. The unbundling of customer premises equipment and inside wire (both investment and maintenance components) from basic services are examples of this latter case (NRRI, 1991).

So what considerations would help define the basic telephone service? In particular, is there an economic and/or social rationale which can provide guidance in determining what aspects of the telephone service should be covered within a universal service requirement? Work published by the US National Regulatory Research Institute (1991) upon which the following discussion is significantly based, helps to address this question.

Table II.1. Evolution of the "basic" telephone service concept

<table>
<thead>
<tr>
<th>Date</th>
<th>Basic service components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900s</td>
<td>Cord switchboards, party lines.</td>
</tr>
<tr>
<td>1920s</td>
<td>Limited local dialling, operators still required to place many metropolitan area and most rural area calls.</td>
</tr>
<tr>
<td>1940s</td>
<td>Introduction of national Direct Distance Dialling (DDD), most manual switchboards eliminated, use of party lines all but gone except in rural areas, Touch Tone introduced as premium service option.</td>
</tr>
<tr>
<td>1970s</td>
<td>Widescale replacement of electromechanical central offices with analog stored program control electronic switching systems, full mechanisation of toll billing, limited introduction of central office based &quot;custom calling services&quot;.</td>
</tr>
<tr>
<td>1980s</td>
<td>General availability of International Direct Distance Dialling (IDDD), extensive deployment of digital carrier on interoffice and interexchange trunks, &quot;Equal Access&quot; to interexchange carriers, basic and &quot;enhanced&quot; 9-1-1 service, extensive use of public &quot;voice&quot; network for data communications.</td>
</tr>
<tr>
<td>1990s</td>
<td>Full deployment of common channel signalling at the end office level, introduction of many new software-based network features, introduction of digital plant for business and residential subscriber access lines, adoption of Touch Tone as the &quot;standard&quot; offering, deployment of new &quot;Open Network Architecture&quot; interconnection and network access arrangements, introduction of limited ISDN at the subscriber level, implementation of TDD/voice relay systems.</td>
</tr>
</tbody>
</table>

a) The economic rationale

There seem to be two contrasting views of the nature of the telecommunication public switched network. These views are those of the telecommunication network as a “private good” versus the telecommunication network as a “public good”. They lead to significantly different views of the basic telecommunication service.

i) The private-good model

The private-good model emphasises the direct benefits of the telephone network, that is, those benefits that are internally or privately experienced by the subscriber to the telecommunication service. The introduction of new network technology or services under the private-good model is viewed as an enhancement to the existing basic network to be paid for exclusively by those who utilise the enhancement and who are willing to pay for it.

The private-good model is consistent with the fact that many European governments are imposing a value added tax at a rate equivalent to other services on the telephone service. This practice would seem to deny that they view the telephone as an essential or as a “merit” good. (At any rate they do not treat telecommunications like food upon which no tax is imposed.)

The private-good model is thus consistent with a demand-driven approach to the evolution of the public switched network. This is the approach which seems to have been primarily adopted in most countries. Perceived subscriber demand for network infrastructure investment will be translated through the market process to the supply of the necessary infrastructure where it is considered profitable.

The private-good model implies a definition of the basic telecommunication service at today’s lowest common denominator of “basic” service both in terms of scope and definition. As Wheatley (1988, p.5) concluded:

“The definition of ‘basic’ service would thus be based upon the standard network offering as it exists at a given point in time (e.g. today). Any enhancement of the infrastructure beyond the capabilities necessary to support that ‘frozen’ definition of basic service would be automatically and permanently treated as ‘non-basic’.
As such, any network enhancements beyond those embraced by the
fixed definition of 'basic' would have to be priced at a level sufficient
to fully recover all of the costs of upgrading the network to a point
where the enhancement can be offered."

This private-good approach is seen to have several advantages. First,
it provides the lowest basic service rate for those customers who do not express
a preference for more advanced network features and functions. In a sense, this
model establishes a definition of basic service analogous to those used by
regulators and telephone companies in establishing "lifeline" type services. This
approach used in the United States and the United Kingdom is a relatively low
cost approach intended primarily to encourage or maintain high
telecommunication penetration rates. Another consideration related to a
relatively narrow definition of basic service associated with the private-good
model is that the fewer the services included within the definition of basic
service, the less expensive it will be to achieve universal service goals or
obligations.

A second major advantage of the private-good model is considered to
be that it can produce an efficient regulatory outcome consistent with that of
effective competition. That is, the benefits to consumers from a new service are
demonstrated by their willingness to pay for the new service and that the
aggregated individual willingness to pay is equal to the cost to society of
producing the service.

The economic efficiency of this approach depends, of course, on
network externalities being unimportant. The NRRI Report (1991) argues,
however, that in regard to telecommunication, externalities are important:

“Societal benefits do exist, and come in many varieties...they include
the economic growth and development aspects associated with the
Rural Electrification Administration and accelerated modernisation
programs as well as the public health, safety, and welfare aspects of
9-1-1 services. They also include the classic "positive" or "benefit"
network externalities which relate to the increased value to individual
network users that results from the presence of and potential
interaction with other network users. These benefit externalities
produce a divergence between the private outcome (based strictly upon
the internal benefits to the individual consumer as measured by that
consumer's willingness to pay for the service) and the socially optimal
outcome (which recognises the interdependence of individual utilities
and the additional social benefits uncaptured by the individual private
calculus of the costs and benefits of network services). If left to the private market, services of real value to society as demonstrated by both internally and externally realised benefits would not necessarily be provided and would be provided at less than optimal levels or both.” (p.72)

Another concern regarding the private-good approach is that it may preclude an orderly evolution of basic network services over time. As was noted earlier, the evolution of the public switched network has led to a changing perception of basic telephone service. Yet, under the private-good approach, the definition of basic network service would be largely frozen as of a given, inherently arbitrary, point in time and might be difficult to change in the future unless a process for reviewing the coverage of universal service at regular intervals is formally embedded (e.g. in legislation or in the terms of reference of the regulator).

ii) The public-good model

By contrast with the private-good model, the emphasis of the public-good model is on the total societal benefits -- both direct and indirect -- associated with the telecommunication network. The public-good model emphasises the economic growth and development benefits of telecommunication infrastructure investment, and in addition, recognises the societal benefits which can be attributed to investment in the telecommunication network infrastructure including environmental, public health, safety and welfare enhancements, classic “positive” network externalities, and other indirect or intangible subscriber benefits.

In short, the public good model implies that a policy assuring a relatively high level of basic universal service will yield significant economic benefits. In this view, even if such benefits are not realised by telecommunication firms, they will accrue as gains in efficiency to society at large. For instance, in a report prepared for Telecom Australia, Bliss Research (1991) includes as part of the overall benefits of universal service provision of telecommunication to Australian Aboriginals living in remote areas, the following benefits:

-- Telecom's revenue (which the report quantifies);

-- consumers' surplus (which the report quantifies and refers to as "customer benefit");
-- benefits of improved community services (unquantified, but considered to be large);

-- benefits of business expansion (unquantified, but considered to be small and growing);

-- existence benefits and the saving of life and limb (unquantified, and with size unknown); and

-- strengthening of cultural ties (unquantified, but considered to be positive).

It is sometimes suggested that telecommunications might provide economies in treating illness in the United States. Because the nation's medical bill is so large, even a small percentage reduction could amount to many billions of dollars saved. Arguments for such a policy are also sometimes put on the grounds of equity, enhancement of democracy, increased citizen participation and other values.

Some regulators too appear sympathetic to the view that the externality effect of telecommunication consumption is at least potentially important with widespread impacts. For instance, OFTEL's Director-General has acknowledged the existence of telecommunication externalities in the following way [United Kingdom White Paper, OFTEL (1991a), p.62]:

“A movement in the direction of lower call prices has significant potential advantages. It is likely that the future will find business making more and more extensive use of the telephone and that residential customers will do so also. The benefit may be enhanced because telecommunications can be a substitute for travelling -- people may be able increasingly to work from home and to substitute telecommunicating for meeting: lower prices for telephone calls may bring a social benefit in terms of reduced public expenditure on travelling and reduced congestion on the roads.”

This view is particularly notable in that it perceives telecommunications as having the considerable advantage of being a “green” technology, facilitating the necessary interactions of modern business and social activities with minimal environmental costs. Moreover, the new and emergent telecommunication technology of radio tails and satellite-based mobile communications which minimises the need for cable-laying trenching, promises to be even greener.
The public-good model views telecommunications on the basis of a public interest standard and its collective consumption aspects. It implies a definition of the basic telephone service which is constantly evolving to incorporate the latest deployed technology and service capability. The public-good approach favours a broad dissemination of new telecommunication capabilities. New telecommunication features or services would not be limited to those who can afford (or are willing to pay) additional charges to the telephone company for "premium" services.

In principle, this approach could allow for a more orderly and strategic programme of investment in telecommunications -- for example, a national optic fibre broadband network -- and one that is planned and executed within the larger context of other community and national priorities and goals.

The public-good model is consistent with a "supply-driven" approach to telephone infrastructure development. The wide distribution of Minitel in France is an example of a programme which was supply-driven and implemented largely independently of market demand (that is, of customer willingness to pay).

A major concern regarding a public-good model of the telecommunication network, however, is that it would foster a potentially expansive and expensive application of universal service.

The strength of the private-good versus public-good case towards telecommunications appears to depend importantly on the extent of the externality effect in telecommunication consumption (and production). Indeed, the presence of externalities seems to underpin the most frequently argued case for subsidising residential access to basic telephone service. The argument in essence is that additional subscription to the telephone service yields benefits to others since it increases the number of people they can reach by phone. In deciding whether to subscribe to the phone service, however, a subscriber tends to ignore the benefit that subscription confers on others. So, from a social perspective, if service is priced at cost, fewer people could subscribe to the network than would be optimal.

A second type of consumption externality that may be relevant is the notion that the average person derives utility from knowing that other people, such as relatives and friends, have access to a telephone in an emergency.

Consumer advocates generally contend that the external benefits are quite large, and so justify pricing basic telephone service well below the
marginal cost of provision. For instance, the United Kingdom National Consumers Council (NCC) has argued (NCC, 1991), that an increase in telephone subscribeship generates benefits that go well beyond those that are usually measured in network economic studies. It claims that these benefits can include, for example:

-- improved functioning of the job market if unemployed people are on the phone;

-- a cost-effective way for social services to keep in closer touch with their clients, especially important for the new community care arrangements; and that

-- the potential for opinion registration by telephone (for example, in response to television programmes) to be more representative.

As the National Consumers Council (1991) argued:

"That such benefits are hard to quantify does not make them any the less real. Given that telephone penetration is already well over 80 per cent, and that the cost per line of assistance to those not on the phone would be modest, we think there is probably a good economic case for completing the network. In addition, of course, there is a strong social argument that the phone is simply too important to modern life -- not least for calling the emergency services -- for anyone to be deprived of it. As the phone comes to be used more for accessing information, this argument will grow in force and become one about equality of opportunity." (p. 31)

Other commentators have argued that while the network externality effect may be significant at the lower penetration levels prevailing in less developed countries, it is less significant at relatively high penetration levels such as those achieved in developed countries.

BT appears to agree with this view arguing (BT, 1991, p.56) that in practice, network externalities will be very low in the United Kingdom since telephone penetration there now amounts to nearly 90 per cent. Moreover, BT argues that businesses do, in fact, take the impact on others into account when they install a telephone (i.e. they place a value on giving people the ability to telephone them), while residential customers will often take the impact on friends and relatives into account.
After an extensive survey of the literature, Kahn and Shew (1987) conclude:

"It is simply not clear on *a priori* grounds how the large increase in telephone penetration over the last half century has affected the external value of adding a marginal subscriber to the network. On the one side, it would tend to increase as subscribership approached universality, because the larger the body of existing subscribers, the greater the number of beneficiaries. On the other hand, it could be that, as subscription has exceeded 90 per cent, marginal subscribers have come to consist disproportionately of people relatively isolated from society generally, to whose hypothetical addition to the network existing subscribers would impute progressively smaller values." (p.242)

Nevertheless, Kahn and Shew (1987, p.242) point out that empirical investigations do suggest that the marginal externality benefits of even the relatively small percentage of subscribers who would drop off the system if basic service charges were substantially increased cannot be ignored, even on grounds of economic efficiency alone.

Certainly the concern over marginal subscribers who are forced to exit the telephone system is considerably strengthened if one takes into account the desirability of keeping telephone service widely affordable on social, political and income-redistributional grounds.

b) *The equity rationale for universal service obligations*

In fact, the predominant rationale for universal service policies in various countries seems to be based on "equity" or "fairness" considerations rather than economic ones. But equity is an ambiguous concept, and there is usually protracted debate about what it implies.

Balnaves and Richardson (1990, p.14) have interpreted the concept of equity when applied to telecommunications in the following way:

"Social equity as equality entails satisfaction of the basic telecommunications need (however defined) for all and identification of individual circumstances which might prevent citizens from meeting that need. The primary goal of social equity therefore, is to guarantee the basic telecommunications need for all, which includes
essential access to and participation in the telecommunications network. Equality in meeting needs, however, does not extend to those individual telecommunications needs which are not basic.”

Some commentators have argued that rather than focus on an essentially “bottom line” approach to defining equity in universal service, the focus on equity should be on defining what aspects of telecommunication usage are fundamental rights. The fundamental definition of social equity could be expressed in both horizontal (amount of access) and vertical (quality and range) terms.

The distinction between “equality in service provision” and the “user pays” approach should also be explained with greater clarity. Access to telecommunications does not guarantee or encourage “participation” or use, unless certain enabling conditions are met. These conditions would include ability to pay and aspects of the service such as ease of use and quality of service. Put bluntly, “equality of access” could be an empty goal because it ignores the possibility that “equality of participation” would require other interventions. This is a fundamental distinction which could allow for a much clearer analysis of the issues.

This is the context within which to consider the suggestion that the concern over access to the new telecommunication services would be met simply by the specification of touch-tone telephones (which would allow access to these services) as part of universal service requirements.

5. The dimensions of universal service

Section 2 of this chapter referred to the need for a specific definition of universal service obligations so that they can be articulated in terms of operational, monitorable, programmes. From the discussion of the concept of universal service in Section 3, it became clear that there are several perspectives and dimensions to the universal service objective. This section attempts a further clarification and specification of the constituent elements of the universal service objective in order to make it more operational and amenable to programme development and evaluation.

The first task in identifying the component elements of a universal service objective is to examine how different countries have given expression to concerns over universal service.
In the EC Green Paper on Telecommunications, universal service is taken to mean:

a) provided with general geographical coverage;

b) provided on demand to all users on reasonably the same terms regardless of the users' location within the service providers' territory or franchise area and the cost of connection to the network.” (Cited in OECD, 1991, p. 26).

Access to a telephone service by those living in rural and remote areas is in fact the most common aspect of the universal service concern. Such telephone access is seen to be particularly important in many countries not only for the conduct of business (especially in areas where the mail might not be delivered for weeks at a time), but also for education, health and the maintenance of social links between family, friends and the broader community.

In the United Kingdom, BT's licence requires it to “provide or cause to be provided to every person who requests provision of such services at any place in the Licence Area:

a) voice telephony services; and

b) other telecommunications services”.

BT is also required to provide public call box services, although under certain conditions the company is relieved of that liability if revenues from the call box have fallen below some minimum figure agreed beforehand with the Director General for Telecommunications. In addition, BT is required to provide various services to the disabled.

There is no explicit requirement in the licence for uniform charges to be levied, but the Director General must be notified of any intended charges and may object to them.

Like other regulators, OFTEL, the British telecommunication regulatory authority has also been concerned with affordability of service to particular sections of the population.

The new British Competition and Services (Utilities) Act 1992 also empowers OFTEL to set targets for BT's quality of service.
In the United States, the already high aggregate level of telephone penetration has led to attention being focused on schemes designed to bring service to the unconnected 7 per cent and to prevent shifts in the relative prices of services (especially a rise in access charges) from forcing poorer subscribers off the network (Perl, 1986; Johnson, 1988; Makarewicz, 1991). But more on this later.

In Australia, the "prescribed carrier obligations" under the Telecommunications Act 1991 require general carriers to give all residential customers the option of having untimed local calls (that is, where the charge for a local call is unrelated to the duration of the call).

This brief survey of the legislation covering universal service policies countries with liberalised telecommunication markets suggests that the constituent parts of a broad universal service target include: (a) universal geographic access; (b) universal access by the disabled; (c) universal affordable access; (d) universal service quality; and (e) universal tariffs.

A second major advantage of the private-good model is considered to be that it can produce an efficient regulatory outcome consistent with that of effective competition. That is, the benefits to consumers from a new service are demonstrated by their willingness to pay for the new service and that the aggregated individual willingness to pay is equal to the cost to society of producing the service.

a) Universal geographic access: subscribership and penetration levels

The number and percentage of a country's households that have telephone service represent the most basic measures of the extent of universal service. Analysis of telephone penetration statistics allows an examination of the extent to which households have been able to acquire, maintain, or discontinue telephone service.

A most widely used measure of telephone availability is the percentage of households with telephone service -- sometimes called a measure of telephone "penetration". Traditionally, telephone penetration was measured by dividing the number of residential telephone lines by the number of households. With some households adding second telephone lines and with an increasing number of second homes, measures of penetration based on the number of residential lines became subject to a large margin of error.
In the United States, by 1980, the traditional penetration measure (residential lines divided by the number of households) had reached 96 per cent, while the number of households reporting that they had telephones in the 1980 census was slightly less than 93 per cent. There can be much disagreement, however, about just what is implied by these telephone penetration rates in regard to universal service. BellSouth, citing a 1990 national penetration rate of 93 per cent in the United States, declared that the “achievement of universal service has been accomplished”, and argued that the remaining households fail to subscribe by choice, not due to a lack of availability.

Table II.2. Telephone penetration in selected American States, 1991

<table>
<thead>
<tr>
<th></th>
<th>Households with a telephone in unit (per cent)</th>
<th>Households with access to a telephone available (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>93.4</td>
<td>95.1</td>
</tr>
<tr>
<td>Alaska</td>
<td>90.8</td>
<td>93.5</td>
</tr>
<tr>
<td>Arkansas</td>
<td>87.6</td>
<td>91.4</td>
</tr>
<tr>
<td>California</td>
<td>95.0</td>
<td>95.9</td>
</tr>
<tr>
<td>Connecticut</td>
<td>96.2</td>
<td>97.3</td>
</tr>
<tr>
<td>Idaho</td>
<td>92.0</td>
<td>93.6</td>
</tr>
<tr>
<td>Iowa</td>
<td>95.6</td>
<td>97.4</td>
</tr>
<tr>
<td>Mississippi</td>
<td>86.0</td>
<td>90.9</td>
</tr>
<tr>
<td>New Mexico</td>
<td>87.1</td>
<td>89.9</td>
</tr>
<tr>
<td>New York</td>
<td>91.9</td>
<td>93.4</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>89.3</td>
<td>91.9</td>
</tr>
<tr>
<td>South Carolina</td>
<td>90.0</td>
<td>93.3</td>
</tr>
<tr>
<td>West Virginia</td>
<td>89.0</td>
<td>93.0</td>
</tr>
</tbody>
</table>


i) Disaggregated penetration measures

The overall aggregate figure for telephone penetration could envelope considerable variation between cities, regions or groups e.g. differentiated by income, age, sex or race. Accordingly, comprehensive disaggregated data could provide useful analytical information for the development of universal service
policies. However, disaggregated data on penetration levels seems rarely collected, except to some extent in the United States. Hence the US measures are of interest since they provide an example of the kinds of measures which might be usefully assembled by other countries.

As a result of a request from the US Federal Communications Commission (FCC), the US Bureau of the Census now gathers data on telephone penetration in its nationwide survey of about 58,000 households, which it conducts three times a year. According to this Census data, the percentage of US households with a telephone rose from an average of 91.6 per cent in 1984 to 93.3 per cent in 1991. The information gathered shows, however, that the average figures conceal a significant variation of penetration rates for various regions and groups. For example, as Table II.2 shows, a state-by-state breakdown yields penetration figures in 1991 ranging from 86.0 per cent (Mississippi) to 96.2 per cent (Connecticut). A general improvement can be seen by comparing 1991 penetration rates with the corresponding rate for Mississippi and Connecticut in 1984, 82.4 and 95.5 per cent, respectively.

b) Universal affordable access

i) Penetration rates according to income, ethnic and demographic characteristics

Disaggregated figures show also that, although virtually all US households exhibited higher penetration rates in 1991 than in 1984, the penetration levels differ significantly for people of different ethnic background, and household size (Table II.3).

As Table II.4 shows, a substantial number of American families in the lowest income brackets (annual income less than $5,000) do not have a telephone on their premises. While this finding holds regardless of ethnic background, it is most pronounced among minorities. In 1991, those with lower penetration rates included all American families with annual incomes less than $5,000 (73.9 per cent), and particularly the low income households comprised of Black-Americans (63.3 per cent), those with Hispanic backgrounds (65.2 per cent), and Native-Americans (as low as 3 per cent penetration on some Indian reservations).

The percentages improve for low income families as a group and for Americans of African and Hispanic origins (80.1 per cent, 71.2 per cent, and
71.3 per cent, respectively, in 1991) when the standard becomes telephone availability, i.e. whether there is a telephone either on-premises or elsewhere on which members of a household can be called.

Lower penetration rates among minority households persist (while gradually narrowing) well into middle income ranges. In terms of telephone penetration by household size and ethnicity (Table II.3), the trends reflect some improvement. While penetration has risen by 1.6 per cent for white Americans over the 1984-91 period, the rates for Black-Americans and Hispanic-Americans have grown by 3.7 per cent and 3.2 per cent, respectively.

Some disaggregated information is also available for the United Kingdom. Milne (1990) points out that while 85 per cent of households in the United Kingdom had phones in 1988, the figures, when broken up, highlight areas where the penetration rate of phone subscribership was much lower:

-- Northumberland coalfields council estates: 40 per cent;
-- unfurnished tenants: 66 per cent;
-- furnished tenants: 45 per cent;
-- single pensioners: 72 per cent;
-- lone-parent families: 62 per cent.

ii) The provision of payphones

As noted earlier, BT's license requires it to provide a adequate number of public payphones. Many other countries also require the provision of payphones as part of a universal service requirement. For instance, the 1991 Australian telecommunication legislation introduced a requirement that payphones be supplied so as to be reasonably accessible to all people on an equitable basis, wherever they reside or carry on business.
<table>
<thead>
<tr>
<th>Year</th>
<th>Household Size</th>
<th>White Caucasian</th>
<th>Black American</th>
<th>Hispanic Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>Total</td>
<td>93.2</td>
<td>79.8</td>
<td>80.9</td>
</tr>
<tr>
<td></td>
<td>1 person</td>
<td>90.3</td>
<td>74.9</td>
<td>72.9</td>
</tr>
<tr>
<td></td>
<td>2-3 persons</td>
<td>94.5</td>
<td>82.3</td>
<td>82.0</td>
</tr>
<tr>
<td></td>
<td>4-5 persons</td>
<td>93.9</td>
<td>81.8</td>
<td>83.9</td>
</tr>
<tr>
<td></td>
<td>6+ persons</td>
<td>89.8</td>
<td>76.3</td>
<td>79.2</td>
</tr>
<tr>
<td>1988</td>
<td>Total</td>
<td>93.8</td>
<td>81.8</td>
<td>83.0</td>
</tr>
<tr>
<td></td>
<td>1 person</td>
<td>91.3</td>
<td>77.8</td>
<td>79.5</td>
</tr>
<tr>
<td></td>
<td>2-3 persons</td>
<td>95.1</td>
<td>83.9</td>
<td>83.8</td>
</tr>
<tr>
<td></td>
<td>4-5 persons</td>
<td>94.3</td>
<td>83.6</td>
<td>84.4</td>
</tr>
<tr>
<td></td>
<td>6+ persons</td>
<td>89.8</td>
<td>77.4</td>
<td>80.6</td>
</tr>
<tr>
<td>1991</td>
<td>Total</td>
<td>94.8</td>
<td>83.5</td>
<td>84.1</td>
</tr>
<tr>
<td></td>
<td>1 person</td>
<td>92.8</td>
<td>79.8</td>
<td>77.7</td>
</tr>
<tr>
<td></td>
<td>2-3 persons</td>
<td>96.0</td>
<td>85.8</td>
<td>86.2</td>
</tr>
<tr>
<td></td>
<td>4-5 persons</td>
<td>95.1</td>
<td>84.3</td>
<td>85.1</td>
</tr>
<tr>
<td></td>
<td>6+ persons</td>
<td>90.5</td>
<td>81.0</td>
<td>82.0</td>
</tr>
</tbody>
</table>

Table II.4. **1991 annual average of telephone penetration by income brackets in the United States**

<table>
<thead>
<tr>
<th>1991 annual average ($)</th>
<th>Total Telephone in unit</th>
<th>White race Telephone in unit</th>
<th>Black race Telephone in unit</th>
<th>Hispanic origin Telephone in unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5 000</td>
<td>73.9</td>
<td>80.1</td>
<td>78.3</td>
<td>83.7</td>
</tr>
<tr>
<td>5 000 - 7 499</td>
<td>82.9</td>
<td>86.8</td>
<td>85.2</td>
<td>88.8</td>
</tr>
<tr>
<td>7 500 - 9 999</td>
<td>86.5</td>
<td>89.7</td>
<td>88.1</td>
<td>91.0</td>
</tr>
<tr>
<td>10 000 - 12 499</td>
<td>88.9</td>
<td>91.6</td>
<td>90.0</td>
<td>92.5</td>
</tr>
<tr>
<td>12 500 - 14 999</td>
<td>91.1</td>
<td>93.4</td>
<td>92.1</td>
<td>94.3</td>
</tr>
<tr>
<td>15 000 - 19 999</td>
<td>93.4</td>
<td>95.2</td>
<td>94.3</td>
<td>95.9</td>
</tr>
<tr>
<td>20 000 - 24 999</td>
<td>95.5</td>
<td>97.0</td>
<td>96.0</td>
<td>97.5</td>
</tr>
<tr>
<td>25 000 - 29 999</td>
<td>96.8</td>
<td>97.9</td>
<td>97.3</td>
<td>98.2</td>
</tr>
<tr>
<td>30 000 - 34 999</td>
<td>98.3</td>
<td>98.9</td>
<td>98.6</td>
<td>99.2</td>
</tr>
<tr>
<td>35 000 - 39 999</td>
<td>98.7</td>
<td>99.1</td>
<td>98.8</td>
<td>99.3</td>
</tr>
<tr>
<td>40 000 - 49 999</td>
<td>99.1</td>
<td>99.5</td>
<td>99.2</td>
<td>99.6</td>
</tr>
<tr>
<td>50 000 - 59 999</td>
<td>99.5</td>
<td>99.7</td>
<td>99.5</td>
<td>99.7</td>
</tr>
<tr>
<td>60 000 - 74 999</td>
<td>99.7</td>
<td>99.9</td>
<td>99.7</td>
<td>99.9</td>
</tr>
<tr>
<td>75 000 +</td>
<td>99.7</td>
<td>99.9</td>
<td>99.7</td>
<td>99.9</td>
</tr>
<tr>
<td>Total</td>
<td>93.4</td>
<td>95.1</td>
<td>94.8</td>
<td>96.2</td>
</tr>
</tbody>
</table>

*Source: FCC (1992).*

To what extent does accessibility to a public payphone satisfy the universal service requirement? Some might argue that payphones do not constitute a viable alternative to a telephone in the home as they provide only a one way communication facility; the caller must initiate the contact and cannot be reached with the same convenience as a person with a telephone in the home. Nevertheless, payphones are undoubtedly an important means of allowing access to the network by people without a telephone in their home. As the United Kingdom's National Consumer Council argued:

"Public payphones are not simply a 'convenience', but for individuals and families unable to pay the 'access' charges (installation perhaps, deposits, plus rental) -- which can be an impossibly large sum for those on lower incomes -- they are an essential service."

At any rate, there now seems broad acceptance that the provision of an adequate number of payphones is an important aspect of a telecommunication operator's universal service obligations.

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iii) Emergency services

An important element in the concern for universal service is the belief that everyone should be able to access the emergency services by telephone. For this concern to be addressed effectively, it is important to have a single code for emergency use which works from any telephone. It seems widely considered that public payphone operators should be required to provide emergency calls free, and to design their installations so that emergency calls can continue to be made under the widest possible range of fault conditions. Wherever technically possible, the emergency call facility should be available even on lines that are otherwise out of service.

c) Universal service quality

The provision of universal service is not satisfied simply by connection to the network. The service provided must be of a stipulated quality, e.g. it should be of a comparable quality with the rest of the network. Indeed, in regard to quality of service, a concern which has been expressed is that while competition has led to significant improvements in quality of service for large business customers, residential and small business customers have not shared in such quality improvements. At least not to the same extent.

Some commentators fear that the pressures of competing for the business of large high-revenue customers might result in a decline in quality of service for residential customers, including universal service and other less profitable customers. A poor quality of service for certain services to, for example rural or remote subscribers, might influence decisions about whether to subscribe to the telecommunication service or whether to retain subscribership.

Consumer advocates argue that all customers not just large business users should benefit from quality of service improvements and that it would be possible to ensure that this occurs by agreeing on and establishing a set of quality of service indicators and using them to monitor improvements in quality of service for all customers.

i) Dimensions of service quality

Work to identify appropriate quality of service indicators, which is a prerequisite for such a monitoring procedure to be implemented, appears to be in reasonably broad agreement in regard to the dimensions of quality of service for
telecommunications. For instance, a survey of the literature on quality of service e.g. FCC (1991), Mitchell (1990), Bauer (1991), the United Kingdom National Consumer Council (1991) and the OECD's own work (OECD, 1990), indicate reasonably consistent suggestions about the categories of quality of service indicators which should be included.

These are:

-- telephone installation;

-- service provision;

-- fault incidence;

-- fault repairs;

-- call failure rates;

-- public payphone density and serviceability;

-- operator services;

-- voice transmission quality during calls;

-- billing accuracy.

The following elaboration of these indicators (which draws significantly from Bauer, 1991) may be useful.

**Telephone installation** refers to the initial installation of telephone service, but also includes changes in service such as upgrading from multi-party to individual service, or adding an extension. Aspects of this type of service provision that subscribers consider important are, for example: waiting times for telephone installations; readiness or refusal by operators to make installation appointments or to make appointments for specific times; that the operator meets an installation appointment; the manner in which the telephone operator's staff deals with requests for service or for information on rates; the accuracy of the information provided by installers or service representatives to customers, etc.

The **repair service** provided by a telephone operator is another important dimension of quality subscribers are concerned with. Aspects of
quality identified in this respect are: the incidence of repair requests which involve subscribers' phones being out of order due, for example, to an extension cord being frayed; the time taken to act upon the reported problem; the probability of obtaining a response when calling to report a fault and to arrange a repair appointment; that appointments are kept, and so on.

The quality of local and long-distance service is dependent upon the performance of the switching equipment used to complete local and long-distance calls. The switching equipment is designed to meet specific standards of performance. If the switching equipment is not meeting these standards, a customer may experience a lengthy delay before receiving a dial tone, or may not receive a dial tone at all. Or he may be able to dial, but the call is blocked rather than completed in the usual manner. Malfunctioning of the switching equipment may result in the customer's call being handled incorrectly. For example, he may reach a number other than the one he dialled, or his call may seem to go nowhere, to simply end in silence. Reflecting such problems, quality criteria identified are: dial tone delay; number of calls which are blocked because switches are in an overflow condition, or which fail due to equipment malfunction.

Another important aspect of local and long-distance telephone service is the quality of the transmission encountered once the connection has been established. Dimensions of transmission quality are for example: level of distortion, balance, loss, background noise and echo.

Another important dimension of service quality to subscribers is the operator service they receive. Aspects of operator service quality that seem to be of importance to subscribers are: the time taken to answer the call and the search time for directory enquiries; the courtesy of directory assistance operators; and the helpfulness and accuracy of operators.

The monthly rates charged for basic telephone service include the provision of a listing in the local telephone directory. Aspects of a telephone operator's directory service which subscribers consider important are: the accuracy of directory listing; the provision of directories; and the delay in providing directory information changes to the directory assistance operators.

The accuracy of bills they receive is of course of considerable importance to subscribers, whether residential or business. Also important to subscribers is that bills are regular and mailed promptly after the billing date.
Finally, the quality of service criteria that seems to be of importance in regard to public payphones are: that payphones work; payphone density; cleanliness; and the possibility of making emergency calls from all such telephones free of charge.

ii) **Quality of telecommunications network capacity**

Bauer (1991) distinguishes the quality of telecommunication service from the quality of telecommunication network capacity. The latter refers to the relationship at the interface between the network operator and lessee of transmission capacity and can be defined by the different elements that are of importance from a lessee's point of view. Quality aspects identified in regard to telecommunication network capacity can be grouped into two broad categories:

-- **provision** of telecommunication network capacity; and
-- **use** of telecommunication network capacity.

**Provision** of telecommunication network capacity refers to the procedure whereby the customer obtains transmission capacity. In this context, aspects that seem to be of importance are for example: waiting time to get a leased line; reliability of installation being completed within the expected time period; variety of leased lines being offered according to the transmission technology (e.g. analogue or digital), quality (e.g. voice-grade or data-grade) and speed or bandwidth; the manner in which requests for information on rates and so on are dealt with.

**Use** of telecommunication network capacity refers to the situation where leased lines are in operation. Quality criteria which have been identified are: the incidence of faults, the time taken to repair a fault, and billing accuracy.

**d) Universal access by the disabled**

The use of dramatically changing telecommunication technology requires new competence which may not be so easily acquired by some, particularly the aged and disabled. Thus this technology also has the potential for creating new barriers and thereby widening differences between those who are able to acquire this new competence and those who are not.

Should people with some form of impairment or disability who may have difficulties using telecommunication equipment and services receive
special consideration? And should this special consideration be mandated as part of the universal service obligation?

The British telecommunication regulator OFTEL considers that it should (OFTEL 1991a, p.30):

“Making the telephone network accessible to deaf and similar people can be seen as part of an extension of the universal service obligation.”

Is this a major problem? How many people are we speaking of? A study by Sandhu and Wood (1990), provides some idea of the potential size of the population which is disabled and, accordingly, of the market for special telecommunication equipment which caters for the needs of the disabled. Across 13 European countries there seems to be a consistent figure of between 10 and 13 per cent of the population who have disabilities. The report groups these disabilities into five areas, as shown in Table II.5.

But while telecommunications can pose problems for the disabled, it also has the ability to be of significant assistance to them. Indeed, new technology has already demonstrated that it can open up avenues of significant assistance for some disabled people. To dispel the stereotype of a telecommunication disabled person as only a hearing impaired person, a range of examples of the disabilities to which telecommunication can be of assistance is given below.

Table II.5. The number of disabled in 13 European countries

<table>
<thead>
<tr>
<th>Disability</th>
<th>Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower limbs</td>
<td>18.7</td>
</tr>
<tr>
<td>Hearing</td>
<td>8.7</td>
</tr>
<tr>
<td>Mental</td>
<td>7.4</td>
</tr>
<tr>
<td>Visual</td>
<td>6.5</td>
</tr>
<tr>
<td>Upper limbs</td>
<td>6.1</td>
</tr>
<tr>
<td>Verbal communication</td>
<td>3.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35.1</strong></td>
</tr>
</tbody>
</table>

Text communication can be used by speech and hearing impaired people who cannot use the ordinary audio telephone. For deaf people who use sign language, videophones may provide equal opportunities for two-way interaction using their own language mode. People with intellectual impairment may be able to use video telephones or picture telephones to supplement speech with non-verbal information, or to use graphic sign systems in telecommunication. Access to a newspaper database and a terminal with a synthetic speech or Braille display may compensate for some of the lack of access to information experienced by many visually impaired people. People with speech and motor impairment often communicate slowly. For them, electronic mail and computer conferences may offer a way to participate in social interaction without being handicapped by their limited communicative speed, compensating, to some degree, for their lack of opportunities to participate in face-to-face communication.

It is easy to point to new inventions and the potential positive effects of new technologies, but the reality for many disabled people is out-of-date technology, old fashioned equipment and a lack of standardisation that would be totally unacceptable to society at large. There is a need to consider and implement what special arrangements are to be considered appropriate to ensure equal access and opportunity to telecommunications for people with disabilities.

e) Tariffs for universal service

There are various restrictions placed on the pricing policies of telecommunication operators. To what extent might they be regarded as stemming from universal service objectives? For instance, as noted earlier, in Australia at any rate, both the major operator, the Australian and Overseas Telecommunications Corporation (renamed Telstra), and its new competitor, Optus, are subject to a “prescribed carrier obligation” which requires them to give all residential customers the option of having untimed local calls (that is, where the charge for a local call is unrelated to the duration of the call).
6. Universal service and the new telecommunication services

The definition, cost and mechanisms for delivering universal service will also depend on whether universal service concerns are limited to only real time voice telephony or are to be extended to cover access to new telecommunication services.

The capabilities that an advanced public network is likely to offer -- which could become part of a basic package to be more or less universally accessible -- include: telephone numbers attached to individuals not locations, along with portable phone sets; services that (at least currently) require wide bandwidth such as motion video; a personal computer terminal providing processing power internally or via the telecommunication network; information services that offer large stores of easily retrieved data, such as airline schedules, news bulletins, classified ads, or stock quotations; transaction services that allow anything from banking and shopping at home to telecommuting; and convenience services such as call waiting, caller identification, and call forwarding. For instance, the “basic service package “ could be defined to include certain “advanced” features such as touch-tone dialling, call forwarding, caller identification, access to emergency services, access to the hearing-impaired, etc.

The Australian Communications Law Centre (1990, p.41) drew attention to this issue as part of the universal service debate:

“...there is the issue of the capacity of the network itself, and the extent to which that capacity should be accessible to all. As the network is enhanced, to what extent should residential consumers as well as business customers benefit? For example, if the network has a capacity for call-forwarding or storage of electronic mail, when should access to those services be deemed to be a feature of the standard telephone service -- given that the capacity is, arguably, part of the public switched telephone network? Further, if such intelligence is part of metropolitan area networks, arguably that capacity should be progressively introduced throughout Australia as part of the total public switched telephone network”.

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a) **Should touch-tone telephones be a universal service requirement?**

Touch-tone dialling is now required for a broad array of customer applications ranging from simple telephone answering machines through sophisticated voice-mail messaging systems, information-database retrieval services, interactive services such as on line banking, merchandise ordering, airline-hotel reservations, pay-for-view television, and many others.

The growing number of applications for touch-tone is instructive in demonstrating how a technological development which was at one time considered to be a discretionary service or feature may become essential to the use of other advanced services. To have irrevocably defined basic or essential services in a way which limited them to existing POTS offerings may have placed access to these new services outside the reach of some people, raising the threat of creating an information underclass.

O'Connor estimates (Aspen Institute, 1991, p.19) that without a new definition of universal service, 60 per cent of the US population would be omitted from the information age, especially the 15 per cent of the population now illiterate. She argues that more universal access to advanced, digital telecommunication technology could help provide a way to ameliorate illiteracy and allow the United States to keep up with international competition.

Whether the provision of touch-tone telephones which are necessary to provide access to these services should be made a requirement under a universal service mandate is a question which many countries will need to address. The US NTIA report (NTIA, 1991) while strongly in support of competition, argued that the Federal Communications Commission and the states should interpret the universal service mandate as encompassing services more advanced than the traditional basic voice service. Such an expanded definition, the report suggested, should include touch-tone dialling, ready access to emergency communications, improved services for the hearing impaired and equal access to interexchange carriers. At present states and local telephone companies have the option to participate in the Universal Service Programs, and often supplement those programmes with eligibility criteria, which may exclude subscribers who fail to meet additional tests for age, income, and disability. Telephone companies encourage state PUCs to expand subscriber eligibility and provide a range of tariffed services which may be included in discount programmes.

In the United Kingdom, evidently about seven million subscribers are still connected by hard-wire phones so that they are unable to plug in other now rather commonplace equipment such as answering and fax machines. Access to
a fax machine could be an important universal service issue for those living in remote areas which are less frequently served by the postal service. Perhaps one reason for the large number of such phones still in use is that BT charges about £50 to convert hard-wire to touch tone. Moreover, acknowledging that hard-wired rotary dial telephones are inferior to touch tone, BT has recently (April, 1992) reduced the rental on the former from £15.20 to £11.00. This could be an added disincentive for the disadvantaged groups likely to be prominently represented among those still on rotary dial to convert to touch-tone. They are therefore precluded from accessing the growing range of new telecommunication services. Some have suggested that conversion has been slow because it is in BT's interests to maintain a captive market of hard wire telephone subscribers. Therefore, they argue that conversion cannot simply be left to BT. There needs to be deliberate action to accelerate conversion to touch-tone. They urge that the provision of touch-tone telephones in the United Kingdom be made a requirement under a universal service obligation. Universal touch-tone telephones would at least ensure universal access to advanced telecommunication services.

b) The Massachusetts decision that ISDN is a basic service

An interesting recent development in regard to the treatment of new services for universal service purposes is the decision made recently by the state of Massachusetts Department of Public Utilities in regard to ISDN Basic service. In brief, the Department concluded that New England Telephone's ISDN basic service offering is a "basic monopoly service" that is necessary for a customer to obtain access to the ISDN-based digital capabilities of the public switched network (Trends in Communications Policy, March 1992, p.1). According to this viewpoint, the ISDN basic service is not an auxiliary service. Rather, it is a platform upon which a wide range of ISDN applications, features, and services can be developed and offered by the telecommunication operator as well as by other unaffiliated information and enhanced service providers.

These arguments may continue to be debated at length. The point here is simply that universal service is not a static but a dynamic concept. This means that it is important to ensure that there is a process for the continuing review and redefinition of universal service objectives and coverage.

Each society will have to decide for itself which of the many telecommunication services should become part of the universal service goal, in what form, at what and at whose cost. At the root of this decision will be the nature of that society's commitment to equality. Further, each country should
recognise that in deciding whether a universal service should be expanded beyond what would be provided by a competitive market structure, the social benefits need to be weighed against costs which could arise from the distortions in competitive markets which might be created.

Dordick (1991) has sounded a warning that the recent direction of public policies toward minimising government intervention and maximising reliance upon competitive markets may conflict with the need for explicit planning that universal service issues appear to impose on government. As Dordick concluded:

“There will be a need for active government involvement even as competition, deregulation, and privatisation of much of the telecommunication network proceeds. Universal service cannot be a matter for laissez-faire evolution; explicit decisions will have to be made. If they are not, if government allows telecommunications to develop without an overt plan for upgrading universal service, such an approach will itself amount to an implicit decision to allow the level of service offered as ‘universal’ to deteriorate drastically relative to the state of the art”.
III. THE IMPACT OF COMPETITION ON UNIVERSAL SERVICE OBLIGATIONS

1. Introduction

Competition for voice communication either through service or through both service and infrastructure competition has thus far only been implemented in a few OECD countries. These countries include New Zealand, Japan, the United Kingdom, the United States (partly), Australia and Sweden (as yet in an embryonic stage only). For the most part, countries have retained a monopoly situation over the public switched telecommunication network (PSTN) and voice communication.

Some countries are reluctant to allow competition in basic telecommunication services and in the provision of telecommunication infrastructure because they fear that competition would have a detrimental effect on universal service. Indeed, some countries maintaining reserved services and infrastructure essentially view competition and universal service obligations as being antithetical.

However, the arguments why this should be the case are often not well developed or documented. Nor has persuasive evidence been presented that competition impacts adversely on universal service.

This chapter commences by examining a number of reasons why there are concerns that competition will impact adversely on universal service. It then proceeds to seek and examine the evidence available thus far about the effects of competition on universal service, drawing particularly on the experience of countries which have proceeded with market liberalisation.
2. Three concerns that liberalisation will threaten universal service

*Liberalisation concern No.1:* Competition will lead to prices which are cost-based.

This is the argument that if there is no competition in telecommunication infrastructure and basic services, there would then be no need to rebalance existing price structures, which traditionally have reflected the use of cross-subsidisation from international and long-distance call revenue to maintain low connection and local call charges. In reality, however, pressures from competition at the international level, and from increasing by-pass activity by domestic business users, have already required public telecommunication operators to begin rebalancing their tariff structures. As a consequence, this has increased the price of access to the local loop (either in terms of connection and subscription charges or through usage charges). As such, one of the feared impacts of infrastructure and service competition is already being felt by operators which have not introduced competition -- although at a slower rate.

Moreover, even in those countries where a monopoly for telephone service has been retained, a commitment has been made to move to a cost-oriented pricing system. For instance, in Germany, the government has recently reached an agreement with the public telecommunication operator to move prices towards costs over a gradual, three-phased scheme. In effect, tariffs will be increased in the local loop and lowered in the long-distance routes.

Do cost-based prices contradict universal service considerations? Only if universal service is defined as requiring access below cost for all segments of the population. In this context it is pertinent to note that while other essential service utilities such as electricity, gas and water supply are also often made available on the basis of a comparable universal service basis, prices charged by these utilities are being based increasingly on cost of supply (OECD, 1991), and often priced differentially on a regional basis (public transport in some cases being the exception). The point here is that the price-rebalancing issues now facing telecommunications are, by and large, not unique to telecommunications and that in other areas too the need to re-balance prices to reflect costs has been increasingly acknowledged. A major reason for the change is the recognition of the compelling case against cross-subsidisation.
The case against cross-subsidisation

The practice of cross-subsidisation involves excess charges (prices greater than the cost of supply) being levied on some users in order to generate the funds required to subsidise other users of the same product or service (who are charged prices that are less than the cost of supply). In effect, cross-subsidisation implies a consumption tax and a consumption subsidy for different telecommunication subscribers. Cross-subsidisation can arise either as a result of different prices being paid for the same product by different users, or from the application of a uniform price paid for the product regardless of differences in the cost of supply. In either case, prices charged do not reflect the cost of supply to users.

The argument that cross-subsidisation results in economic (allocative) inefficiency has been frequently made and need not be repeated extensively here. Those customers whose consumption is taxed restrict their use of the service even though they may value the consumption of additional units more than the cost of producing them. Consequently, there is a welfare loss. Conversely, those who are subsidised are encouraged to expand their use of the product beyond the point where the value they derive from the good is equal to its cost of production. Again, there is a welfare loss.

Resource use is also altered by the effect which cross-subsidisation has on industries using the service, e.g. those firms using the higher priced telecommunication services more intensively are disadvantaged in competition for resources.

Further resource use and consumption effects can result where the need to preserve cross-subsidisation requires that restrictions on competition be imposed. This need to restrict competition in turn permits the inefficiencies associated with monopoly status (such as cost-padding, restrictive work practices, overemployment and higher prices) to flourish.

Cross-subsidisation has been defended on the grounds that it can meet universal service objectives equitably. However, cross-subsidies are a blunt instrument for delivering equity results because they can also result in (horizontal) inequity. Where universal service is sought through low local call charges for everyone or through all rural connection charges being subsidised, the incidence of assistance is unrelated to the actual need of the recipient. Consequently, people in different income circumstances are treated similarly and this results in horizontal inequity.
In any case, horizontal equity can be achieved more cost-effectively by other methods. Chapter IV details various schemes which can be used to achieve universal service objectives through specifically-targeted assistance directed at lowering various barriers to universal service. Such measures would also meet the criteria which is widely accepted in OECD economies that assistance or special aid should be provided in a transparent way and directly rather than in ways which distort market and pricing structures.

This approach would appear to have the support of the International Chamber of Commerce (1991a, p.26):

"...pricing distortions are both economically harmful and unnecessary to realise the worthy goal of universal service, particularly for countries that have already achieved high telephone penetration rates. Moving towards economically sound cost-oriented pricing principles will alleviate the economic welfare loss engendered by the general and pervasive subsidy scheme; if cost-based local rates are indeed beyond the means of some subscribers, then targeted subsidies directed to those who need them are more logically justified than generalised subsidies to all, buried within the accounts of the TO (telecommunication operator)." 

**Liberalisation concern No.2:** Competition may tend to re-orientate the focus of public telecommunication operators away from meeting universal service and toward competing in other high revenue growth telecommunication markets.

Irrespective of whether competition exists, telecommunication operators will tend to give priority to investment in activities which will generate substantial revenue. Traditionally, public telecommunication operators have made investments to expand the provision of telephone services first in areas of high population densities where revenue growth was assured and only afterwards in higher cost/lower revenue areas. The result of these policies in individual countries would be observable through an examination of main lines per 100 population on a regional basis. Where available, the figures indicate that many lagging regions with low per capita incomes also have low penetration rates because investment by the public telecommunication operator has concentrated in high income, high growth areas.

So while there is a danger that in a competitive environment operators which are mandated to ensure universal service may be distracted by more profitable opportunities, this disposition was always there. Indeed, as noted earlier, under a monopoly environment the outcome for universal service was
often criticised and seldom open to monitoring and evaluation. It is arguable that in a competitive regime, the outcome could well be much improved if universal service activities required of the telecommunication operator are explicitly “contracted” and paid for by government or, alternatively, specifically mandated for delivery by the operator as part of its operating licence. To ensure the effective discharge of the operator's universal service responsibilities, performance should be independently monitored and evaluated by a designated agency.

Liberalisation concern No.3: Competition weakens the financial capability of the public operator depriving the operator of funds though which it can meet its universal service obligations.

Competition in infrastructure and services can reduce the surplus funds of operators since the scope to levy excess charges on some customers in order to fund cross-subsidised universal services would be eroded. This is because the levying of such excess charges would leave those activities vulnerable to competitors. Thus, in the increasingly cost-based regime which will stem from the introduction of competition, requiring an operator to provide universal service at below cost prices would handicap that operator's ability to compete on a fair and equal basis. So that “a level playing field” is maintained, there may therefore be a need to ensure that operators which have universal service obligations imposed on them are duly compensated or that competitors are required to bear an appropriate share of the universal service burden.

3. The impact of competition on factors influencing universal service

The impact of telecommunication market liberalisation will be considered in the rest of this chapter largely in terms of effects on various factors which influence telephone subscription including:

a) telephone call prices;

b) installation charges;

c) rental charges;

d) deposit requirements;
e) technological infrastructure and service innovations benefiting universal service;

f) quality of service;

g) disconnection;

h) reduction of barriers to telephone subscription due to disabilities in regard to telephone access and use;

i) efforts to address factors influencing voluntary non-subscription.

These factors are elaborated upon below.

a) *Telephone call prices*

As in the case of other products, the price of telephone calls will have some influence on telephone subscribeship and usage. High and increasing telephone call prices will reduce subscribeship and particularly usage, whereas low and declining prices would increase the number of those able to afford a telephone and thus assist in achieving universal service. The actual degree of impact that price changes have on universal service will depend, of course, on the price-elasticities of demand for telecommunications exhibited by the various groups the universal service issue is concerned with.

There is, however, very little information about such price-elasticities of demand. A study of price-elasticity in the United States conducted by Perl (1986) concluded that a doubling of the price of telephone service would result in only a 3.2 per cent decrease in telephone penetration. A Canadian study (Federal-Provincial, 1986, p.232) agreed with Perl's finding, concluding that increases in local rates, even by as much as 100 per cent, would be unlikely to result in any significant reduction in telephone penetration levels.

Perl's (1986) elasticity estimates also indicated, however, that there were wide variations in the price-elasticity of demand estimates for various household groups, especially when groups are differentiated by income class. For households with incomes below the poverty level headed by a husband and wife of age 65 and older, a doubling of the price was estimated to reduce telephone subscribeship by 2 per cent. But it was estimated that subscribeship could fall by as much as 20 per cent for males below the age of 25 with incomes below the poverty level.
The implication of these estimates is that while price-elasticity is generally low, there are some subscriber groups such as poor young unemployed males, who would be significantly affected by variations in telephone call charges. That price increases could impact appreciably on such groups is of course highly relevant to the universal service issue.

But what evidence is there about the sensitivity of telecommunication subscribers -- and those not yet connected -- to the higher connection, rental and local call charges that are resulting from the price rebalancing stemming from competitive pressures? OFTEL (1991a) believes that what little evidence there is suggests that most people would not discontinue subscribership to the telephone network as a result of the rebalancing of prices. This is likely to be especially true of customers who now make considerable use of the telephone. However, for low users, low income earners, and indeed, for those who are currently not connected to the network, changing the balance of prices in this way could discourage subscribership to the network.

Another group highly relevant to the universal service issue are those who reside in rural and remote parts of a country. It might be expected that this group too could be significantly affected by increases in telephone connection and rental charges. But the net effect on people in this group is uncertain and cannot be predetermined. This is because a considerable proportion of them may rely heavily on long-distance services and will therefore benefit from the sharp decline in long-distance rates that is resulting from price rebalancing. It may well be these long-distance rates rather than the level of rental charges and local rates which is the more important factor influencing the net impact on the size of their bills and, accordingly, the decision as to whether or not to subscribe (or stay connected) to the telephone service. Hence, it is possible that the increased competition which is driving substantial reductions in long-distance rates may in fact serve to assist the achievement of universal service in rural and remote areas.

b) Installation charges

It is widely believed that for some people at least a principal barrier to having a telephone installed is the amount payable for connection. This belief received some support from a study carried out by the US Association of Consumer Research in 1991 which indicated that the initial cost, of deposit or connection, is the main problem people face in affording a telephone. Another study -- one conducted jointly by the Consumer Federation of America, the American Association of Retired Persons, and AT&T in 1986 -- surveyed
3,300 consumers and found that the inability to pay “front-end” costs of obtaining telephone service, such as installation charges, constituted the primary reason why households were without phones. The survey also identified unpaid bills and the resulting disconnection for non-payment as a major cause of drop-offs from the public switched network.

If connection charges constitute an important barrier to telephone subscribership, the level of the connection charge, how it is required to be paid and any tendency for connection charges to increase as a result of price rebalancing, would all have a significant impact on the telephone penetration rate for lower income groups. Those who change residences frequently would be particularly affected. While the average person changes residences infrequently, some -- especially those under the age of 25 -- move more often.

What accentuates the problem of connection charges is that telephone companies in many countries require subscribers to pay installation charges in an up-front lump sum. This lump sum can be a considerable amount particularly for some of the disadvantaged groups universal service is concerned with. In the United Kingdom, for instance, the standard connection charge for a residential line for a new customer can exceed £150, as shown in Table III.1

Note that these are BT's standard charges. If the work involved in connecting a subscriber exceeds 100 man-hours, BT can and does charge the price of the labour costs above 100 man-hours of work.

Since the actual costs involved in connecting a subscriber to the telephone network are partly dependent on the type or location of the new line, the costs incurred for connecting rural and remote customers would be relatively high.

Indeed, connection charges would be likely to increase more sharply were such increases not constrained by regulation since BT claims that it makes a substantial loss on connections when the cost of this activity is compared against the revenue earned. An OFTEL (1991b) estimate that 99 man-hours of BT's time would cost over £3,000 (in January 1992 prices) compared against BT's charge of only about £150 for connections which do not exceed 99 man-hours would seem to lend support to BT's claim.
Table III.1. **BT's connection charges**

<table>
<thead>
<tr>
<th>Service Description</th>
<th>Fee</th>
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<tbody>
<tr>
<td>New customer</td>
<td>£163.75 incl. VAT</td>
</tr>
<tr>
<td>Removing customer</td>
<td>£140.35 incl. VAT</td>
</tr>
<tr>
<td>Take-over on same day with no alterations</td>
<td>No charge</td>
</tr>
<tr>
<td>Take-over not on same day with no alterations</td>
<td>£36.78 incl. VAT</td>
</tr>
</tbody>
</table>


c) **Rental charges**

The rental charges levied by a telecommunication operator can constitute an important factor inhibiting telephone subscribership for some lower income groups. Indeed, some people, for example, the sick and the elderly, may not make much use of the telephone but nevertheless require it as a “lifeline” for use in an emergency. For these “low users” and low income earners, in particular, the level of the rental charge and the way it is required to be paid, *e.g.* whether monthly, quarterly or yearly in advance, can be very important.

How has competition affected rental charges? OFTEL (1992a, p.23) has acknowledged that residential users who do not make many calls and who therefore have telephone bills in which the line rental is an important element will tend to face higher bills as the process of price rebalancing resulting from competitive pressures continues. (Efforts in the United Kingdom and United States to offset the impact of this increase in rental charges through schemes providing special discounts for “low users” are discussed later in the next chapter.)

d) **Deposit requirements**

Some telephone companies (*e.g.* those in Canada) require telephone service applicants or subscribers whose credit is not satisfactorily established with them to make a deposit or advance payment equal to an amount that the company considers sufficient to cover service charges, including anticipated long-distance usage for a number of months. Where the payment required is substantial it could constitute a barrier to access for some.
The way that competition has affected this practice is therefore also relevant to this study.

e) Technological and service innovation assisting universal service

It is important to bear in mind the role of technological change as a principal factor fuelling the drive towards competitive telecommunication markets. Technology has transformed the mass market for telecommunications into a growing number of niche markets. The proliferation of radio tails, microwave, cellular and satellite technologies coupled with advances in optical fibre, digitalisation, compression and faster/cheaper electronics has accelerated the growth of new services and can (potentially at any rate) assist the achievement of universal service. For instance, the new technology, by avoiding the need for trenching in order to lay telephone cables, could allow telephone connection to be made at considerably lower cost.

f) Quality of service

The relevance of quality of service to the universal service issue has already been discussed in Chapter II. From a universal service perspective, the question is how competition impacts on the quality of the services used by the beneficiaries of universal service policies, such as those who live in rural and remote areas. Universal service, arguably, refers not merely to universal connection but requires also that services be provided at a comparable quality in low profit as well as high profit areas. Poor quality of service could also be a factor deterring subscription.

g) Disconnection

The achievement of universal service also requires a concern for those who are disconnected from the telephone service.

Telephone service may be denied to some because a previous account had not been paid, for example, an account involving significant long-distance calls. The number of disconnections can amount to a significant proportion of a company's total accounts. For example, in Canada, the British Columbia Telephone Company terminated 21 000 residential accounts for non-payment in 1983 and 24 000 in 1984, representing about 1.6 and 1.9 per cent of the company's total accounts in those two years. To take another example, SaskTel,
a Saskatchewan Telecommunications Company, disconnected 3529 accounts in 1983 and 5400 accounts in 1984, for non-payment. This represented 0.8 per cent and 1.2 per cent of the company's total accounts in those two years.

It is likely that a certain number of accounts will be unpaid regardless of price increases for local services. For example, as indicated above, SaskTel disconnected 5400 subscribers for non-payment in 1984 although there were no rate increases in that year. The non-payment of a telephone bill by some subscribers could be due to a range of circumstances.

Is an increase in competitive pressure likely to raise the number of disconnections? A utility with monopoly power which provides an essential service has the potential to abuse its position by using the threat of disconnection to ensure that the company's interests prevail over those of the customer. Such a utility may be able to enforce its debts in a way which disregards the wider social costs of that disconnection. However, restricting the utility's powers of disconnection may well put up the cost of bad debt (and therefore lead to some rise in the level of prices). Some consider that in a competitive market the power to disconnect would be less likely to be abused since customers could go to another operator, but the evidence in this regard is not conclusive. OFTEL (1991b, p.29), at any rate, believes that in the competitive circumstances prevailing in the United Kingdom it would be necessary to:

"... deal fully with disconnection issues after the passage of the (Competition and Services (Utilities) Bill)."

**h) Efforts to address disability in regard to telephone use**

The relevance of this issue to universal service was also discussed at some length in Chapter II. The pertinent question to be addressed here is whether competition will help or hinder progress in this regard.

**i) Efforts to address factors influencing voluntary non-subscribership**

Little systematic research appears to have been conducted to provide a better understanding of the reasons why some people apparently choose not to subscribe to the telephone service.
A Canadian study on non-subscribership (cited in Canadian Federal/Provincial Examination Study, 1986, p.224) was based on interviews with 71 former subscribers who no longer had a telephone. Approximately one-third of those interviewed cited cost as the reason for non-subscription. They included non-subscribers with a broad range of annual incomes. This implies that while cost can be a common factor in the decision not to subscribe to telephone service, it is unlikely to be the only factor. Other reasons for non-subscribership given by those surveyed included the desire for privacy and a simple dislike of telephones.

A survey conducted in Australia by the Bureau of Statistics (1986) in 1983 and again in 1986 indicated that cost was the main reason for non-connection in 51 per cent of unconnected households while 23 per cent of households recorded lack of need. Remaining main reasons were: renting or short-term accommodation (9 per cent in 1983, 6 per cent in 1986); use of telephone elsewhere (5 per cent in 1983, 7 per cent in 1986); other reasons (8 per cent in 1983, 7 per cent in 1986). There were 4 per cent of households without a telephone (5 per cent in 1983) because they were waiting for connection.

4. Service competition

Without competition, or a contestable market, a monopoly operator would have less incentive to offer diverse services which serve to compete with itself. Without competition, there would not be the pressure to spend the large sums of scarce (government) capital on new developments to replace existing investment which is still productive. A monopoly which offers a wide choice of terminal equipment increases its costs in design, stocking, training staff, maintenance, accounting, etc., without the guarantee of increased profits. It is competitive pressures which drive the delivery of product and service choice.

The proponents of increased competition claim that in those countries where it has been introduced, competition has improved service availability, the cost, range and quality of service, and, indeed, the overall performance of telecommunication operators. Of most interest to this study is that they claim also that competition has not impeded, and indeed, may even have assisted, the achievement of universal service objectives. For instance, it is claimed that telecommunication penetration rates have in fact not declined, but increased.

Technological and marketplace changes are steadily increasing the potential for competitive entry in major parts of the local exchange service
market as well. Deployment of digital technology promises to alleviate the capacity constraints that have limited the ability of cellular radio to compete with local exchange telephone service. Installation of fiber optic transmission facilities by cable television systems will substantially improve their ability to compete with the incumbent operators. Future development of personal communications may further enhance the prospects for local exchange competition from radio-based services.

In the United States, although it is now only beginning, various forms of local exchange competition have been endorsed, and are being implemented in several states. Some 34 different firms are now offering or planning to provide alternative local telecommunications services in more than 38 cities in 26 states (Infrastructure Report, NTIA, 1991).

Even the limited competition that has occurred to date in the United States has caused incumbent operators to rebalance their rates, improve service quality, expand their service offerings, and upgrade their networks with advanced technologies like fiber optic cable. The clear benefits that have stemmed from the introduction of competition into the US interexchange service and CPE markets provide promise that similar benefits can flow from local exchange competition. The success enjoyed in these markets prompted the FCC in 1992 to permit “competitive access providers” and others to interconnect with local networks for the provision of interstate “special access” (private line services). Such competition was extended by the FCC to interstate switched access markets. In 1992 the FCC ordered that interim rates be established for “local transport” (facilities used to transport long-distance calls within the local network). This could presage a system of flexible, more cost-based rates later in the decade.

5. Infrastructure competition and universal service

There is increasing argument that competition in the provision of telecommunications infrastructure as well as services can serve to reduce the costs and, accordingly, the prices of basic as well as new services and hence can enhance rather than erode the prospects for universal service. Thus, rather than necessarily posing a threat to the affordability of what has long been regarded as “basic” telephone service, there are indications that competition can serve to foster rather than erode universal service.

In the United Kingdom, infrastructure competition is now a fact. BT, Mercury, Kingston, and some 120 cable operators are licensed to build and run
fixed telecommunication networks providing public services. Cellnet, Vodaphone and three PCN operators are licensed to build and run mobile networks. Since March 1991, anyone may apply for a licence authorising them to install and run any kind of fixed telecommunications system within the United Kingdom, and the mobile operators may apply to provide fixed services and so incorporate fixed links into their networks.

Companies operating under the self-provision licence may run their own systems over any distance within the United Kingdom, conveying all categories of voice and data message, and using any kind of transmission medium, including hardwire, radio or satellite. Break out onto the PSTN is permitted, but all traffic conveyed on the system must originate and/or terminate with the licensee or its Group. No remuneration or other benefit may be received by the licensee or its Group in respect of services provided over the system. New entrants, however, do not currently incur a universal service responsibility which remains with BT.

The NTIA Infrastructure Report (1991) concluded that government policies should not attempt to direct the selection of particular technologies or the pace of infrastructure investment by or for private-sector firms. In the NTIA's view:

"Such government-controlled infrastructure development would likely be misdirected from the start and would not be flexible enough to respond efficiently to the demands of rapidly evolving telecommunications technologies and markets".

The NTIA Report argues that rather than mandating investment levels and technology choices, the FCC and the states should encourage further infrastructure development by removing the government-imposed barriers to competition and efficient investment in telecommunication facilities and services that characterise many telecommunication markets.

As the NTIA concluded (1991, p.202-203):

"The soundest way to determine efficient and fair infrastructure development is for government to create a process that can be relied upon to produce the appropriate level of development. In this regard, we agree with the many commenters that argue that, to the greatest extent feasible, infrastructure development should be achieved via the workings of a competitive marketplace. While the general benefits of competition are well known, its importance with respect to
infrastructure development is that it offers telecommunication providers a powerful set of decentralised, independent, and market-driven incentives to make efficient investment decisions. Simply put, customers in a competitive market will identify and penalise under- and over-investments by taking their business from inefficient firms to their rivals”.

6. **The impact of competition on universal service**

   *a*) **Telephone call prices**

   How has telecommunication market liberalisation affected telephone call prices? And more precisely, to what extent will liberalisation result in lower prices for telephone calls in ways which would assist universal service?

**United States**

Table III.2 documents the shift in telephone pricing that took place during the 1980s in the United States. For example, the data show that over the decade, local rates rose by 105 per cent. Since 1980, interstate toll rates have been reduced by 15 per cent and intrastate toll rates have kept pace with inflation. Since the 1984 Modified Final Judgement which restructured AT&T, the consumer price index for all items has increased 24 per cent; intrastate toll rates have decreased by six per cent, and interstate toll rates have been reduced by 31 per cent, while for local rates the consumer price index has increased by 49 per cent.

Mosco (1990) argued that these telephone rate changes represented a significant redistribution in telecommunication costs. First, drawing on information cited in Kimmelman and Cooper (1988), Mosco pointed out that most residential subscribers made few interstate calls. Moreover, over 40 per cent of business-related long-distance calls were made by 5 per cent of business subscribers (presumably mainly large businesses). Second, prior to the AT&T divestiture, the FCC had begun to allow the company to reduce long-distance rates and increase local rates so that the company was in a better position to face the new competitive environment in long-distance rates. Moreover, following the breakup, the newly established local telephone companies were permitted to raise local rates to compensate for the loss of revenue they had previously received from the parent company. Third, all subscribers were required to pay a new monthly fee for access to the national telephone network. Such a fee is
imposed on subscribers whether or not they actually use long-distance services. Though charges levied were higher for business customers, the new charge meant that many residential customers, including low income subscribers, now had to pay for a service that many of them did not use or used only sparingly.

Table III.2. Monthly expenditures for telephone service (for households with telephone service)

<table>
<thead>
<tr>
<th>Year</th>
<th>Basic local service*</th>
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<tbody>
<tr>
<td>1980</td>
<td>$8.70</td>
</tr>
<tr>
<td>1981</td>
<td>$9.70</td>
</tr>
<tr>
<td>1982</td>
<td>$10.80</td>
</tr>
<tr>
<td>1983</td>
<td>$11.60</td>
</tr>
<tr>
<td>1984</td>
<td>$13.40</td>
</tr>
<tr>
<td>1985</td>
<td>$14.50</td>
</tr>
<tr>
<td>1986</td>
<td>$16.10</td>
</tr>
<tr>
<td>1987</td>
<td>$16.70</td>
</tr>
<tr>
<td>1988</td>
<td>$16.60</td>
</tr>
<tr>
<td>1989</td>
<td>$17.50</td>
</tr>
<tr>
<td>1990</td>
<td>$17.80</td>
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</table>

* Monthly service charges for unlimited local service, taxes and subscriber line charges.  

United Kingdom

While the United Kingdom telecommunication market is now the most liberalised in Europe, a survey conducted by the European Bureau of Consumers' Unions (BEUC, 1992), indicates that the United Kingdom's exchange-line rental charges and the price of local calls are about the most expensive in Europe, particularly the service offered by Mercury Communications. According to National Utility Services (1992), Mercury's
charges for peak-rate calls were estimated to be four times higher than those levied by operators in Switzerland and Austria -- the next most expensive countries in Europe. Mercury's response to this charge was that it has not in fact thus far sought to provide a competitive local service for users who have to go via the BT network (Telecom Markets, 20 February 1993 p.9). Mercury's response -- and the case for competition -- seems supported by the fact that Mercury evidently has the third cheapest long-distance service (where it has been putting in considerable competitive effort) in Europe, while BT's performance puts it in the middle of European PTTs.

On the basis of its own comparison of BT's prices with those of telephone operators in France, Germany and Italy, OFTEL concluded that France Telecom -- which faces no competition -- has the cheapest telephone service for residential and business customers. BT and Deutsche Telecom have about the same prices for both, and Italy's prices are higher.

So, thus far at any rate, it would appear that the evidence that competition will lead to lower telecommunication call prices is not conclusive. Long-distance prices have fallen significantly but there have been offsetting rises in local call charges. This rebalancing of prices has probably had an adverse impact on residential subscribers who make few long-distance calls.

There is little doubt that market liberalisation and competition will exert considerable pressure for price restructuring in a way that will have significant impacts on some users.

The Communications Law Centre (1990, p.28) has pointed out that:

“With liberalisation, British Telecom moved from standard connection charges throughout the United Kingdom, to connection charges which, in 1987, varied from £45 in Newcastle to £150 in the east of London. BT may also demand both short- and long-term security deposits of up to £50 above the connection charge, again at local discretion”.

The Centre concluded that the combined effect of rising connection and call charges has been to put telephone subscribership beyond some people's means.

Indeed, competition is already exerting considerable pressure for price rebalancing in the United Kingdom. BT has contended that the deficit on connections and line rentals is substantial and growing so quickly that it faces a major competitive disadvantage with respect to rivals who do not have to
provide exchange lines. BT claims, moreover, that the deficit on line rentals has increased as a result of the change from analogue to digital technology in the network. As a greater proportion of the network operates on digital technology, the proportion of non-usage sensitive costs attributable to the line rentals rises relative to the usage sensitive costs attributable to calls, though network modernisation causes the total level of costs to fall. Therefore, BT forecasts that there will be a substantial shift in the allocation of costs and assets, with a higher proportion of costs than before being allocated to rentals.

BT would like to rebalance prices quickly (BT, 1991a, p. 14) because:

"...without rebalancing BT will be unable to retain call intensive customers because our competitors will progressively avoid BT's services by by-passing BT interconnect".

Table III.3 shows the trend, in index form, of BT's connection charges, exchange line rentals and call charges from 1984 and forward to 1993. It is evident from the table that a significant degree of price rebalancing has already taken place.

b) The impact on connection and rental charges

As Table III.3 shows, in BT's case there has been a significant increase in connection charges and, in recent years rental charges, which have accompanied a reduction in the level of long-distance prices. As far as universal service goes, a major concern in regard to a continuation of this trend in tariff rebalancing towards higher connection and rental charges is that it would result in a substantial increase in the cost of the telephone to those people who make very few calls because the rental charge would now constitute a high proportion of their total bill. This is of special concern since these customers are often those who rely on the telephone as a "lifeline", particularly the elderly and housebound. Most of these low users do not share in the benefits of price rebalancing -- the reducing price of long-distance calls -- but are experiencing the disbenefits -- the increase in rental charges which now constitute a higher proportion of their (increasing) total telephone bill.

c) BT's arguments concerning the need to re-balance prices

The arguments put by BT about its need to rebalance its tariffs are instructive. BT argues (BT, 1991a, p.46) that genuine competition in trunk
services requires a substantial revision of call prices. The current price regime in the United Kingdom requires that trunk and international calls are overpriced in order to subsidise access. The introduction of trunk competition whilst current pricing levels prevail would lead to a massive loss of market share by BT to new entrants who would not have to provide loss making direct access services.

BT argues that the need for price re-balancing is not only a question of "unfair competition". If call prices are inflated artificially, there is a resulting inefficient allocation of resources: competitors are attracted into this sector of the market even if they are inefficient while, at the same time, entry into low usage residential market is deterred. In addition, with relatively few customers contributing the bulk of BT's profits (because of the imbalance of tariffs) and being easily targeted by competitors, the impact of such distorted competition is likely to be an increase in price for BT's remaining customers.

BT considers that there is only one long-term remedy. Rentals should be increased and trunk and international call prices decreased. This would serve the interests of consumers as a whole, and it allows the development of a competitive and efficient industry structure².

OFTEL (1992a, p. 23) appears to have accepted BT's claim (at least in principle) concluding that:

"...it appears to be the case that further rebalancing could be justified on both economic and competitive grounds".

OFTEL was quick to add, however, that the speed of rebalancing should be limited since sharp and unexpected movements in prices may have undesirable consequences in terms of their impact on some groups of customers. As discussed further in Chapter IV, "low users" -- those customers who make relatively few calls -- will face significant increase in their overall bills. This is because they will not experience the gains from the correspondingly reduced call charges, particularly for long-distance calls, which for more call intensive subscribers will serve to offset the increases in rental charges.

d) Deposit requirements

Insufficient information is available to ascertain how competition has affected this practice.
Table III.3. Index of BT's prices adjusted for inflation

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</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>84</td>
<td>89</td>
<td>95</td>
<td>101</td>
<td>95</td>
<td>98</td>
<td>100</td>
<td>102</td>
<td>104</td>
<td>106</td>
</tr>
<tr>
<td>charges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rentals</td>
<td>102</td>
<td>105</td>
<td>105</td>
<td>101</td>
<td>95</td>
<td>98</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trunk calls</td>
<td>151</td>
<td>138</td>
<td>127</td>
<td>122</td>
<td>114</td>
<td>108</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local calls</td>
<td>115</td>
<td>116</td>
<td>122</td>
<td>117</td>
<td>110</td>
<td>107</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Based on 1989-90 revenue weights. Full advantage is taken of the existing arrangements over 1991-93. Directory enquiry charges introduced in accordance with BT's announcement on 10 October.


e) Technological and service innovation and universal service

Some commentators have pointed to the successful provision of telephone service to rural America as an example of how universal service can be successfully provided by private operators. In the United States, the existing rural telecommunication infrastructure is managed, owned and operated by more than 1 200 large and small private companies and co-operatives which together operate over 12 000 exchanges in rural America. According to LaRose and Thomas (1989) the rural telephone companies have performed well:

"There is evidence that at least some rural telephone companies have proved equal to the infrastructure challenge. Generally speaking, the technical performance of rural telephone plant equals or exceeds that of urban systems. Independent telephone companies, many of whom serve rural areas, have been relatively quick to adopt digital switching technology. Rural telephone providers have formed consortiums to facilitate technological change, including equal access and Signalling System Number seven, a key precursor to the worldwide Integrated Service Digital Network (ISDN) in the 1990s. Even fibre-optic technology may become available in rural areas."

The competitive expansion of telecommunication infrastructure also promises further benefits. In particular, the provision of a fibre optic broadband
link supplemented by mobile communications on a nationwide basis would offer the infrastructure to give effect to expanded universal service objectives. Over a period of time such a broadband telecommunication network could be life transforming, providing facilities such as home-working, home shopping and video libraries as well as innovative forms of education, training and leisure. If this occurs, the benefits of achieving universal service could accrue not only to the individual by way of increased communication facilities but also to the community and the economy. This is because, for example, one of the major factors that will contribute to the development of the individual and the economy is training and education. Both can be enhanced by the use of “distance learning” systems. This could mean, for example, that those who need to retrain or improve their education could use interactive systems over the telecommunication network, perhaps to complement whatever they were doing elsewhere. This would also stimulate the development of systems, courses and technology to be used on the network. Competition would serve as a catalyst in the provision of the requisite infrastructure.

f) Quality of service

Has competition in fact led to improvements in quality of service? As far as the United Kingdom is concerned, it does appear that there has been a significant improvement in service quality since 1984-85 when BT was privatised and competition introduced. As Table III.3 indicates (OFTELa, p.15), all the quality of service indicators monitored suggest that quality performance has improved significantly since 1985-86.

g) Disconnection

As noted earlier, no information was available to allow an assessment of whether competition has resulted in more aggressive disconnection policies. As discussed later in this chapter, regulators can be empowered, under legislation exampled by the British Competition and Services (Utilities) Act 1992, to ensure that ethical disconnection policies are practice.

h) Reduction of barriers to telephone access and use due to disabilities

Assistance to the disabled need not diminish under competition. Indeed, the evidence (detailed shortly) shows that even in competitive circumstances, telecommunication operators have considered it to be in the
interests of their public image to voluntarily support schemes to assist the disabled. At any rate, where voluntary assistance is considered inadequate, regulators can be empowered to require operators to increase assistance to the disabled.

i) Efforts to address factors influencing voluntary non-subscription

There are some signs that this can continue to occur under competition. For instance, as noted earlier, Telecom Australia (now TELSTRA) has entered into an accord with consumer organisations to (among other things) conduct research into the factors influencing “voluntary” non-subscribership and ways to address these factors. But governments should also foster independent research on this issue including research to identify innovative ways to address the barriers identified.

7. Competition: the lessons so far

The primary conclusion of this chapter is that competition can generate significant benefits for subscribers, indeed, some in favour of universal service (even when the perspective of the concept is extended to encompass some advanced telecommunication services).

This conclusion that a competitive situation can be an improvement on monopoly even for universal service was also one reached by the US NTIA Infrastructure Report (NTIA, 1991, p.287):

“These pro-competitive policy recommendations are superior to current monopoly-based policies in furthering our advanced universal service goals. Indeed, increased competition in telecommunication markets, including increased entry into local exchange markets, will help the achievement of these goals by spurring innovation in services and reducing prices that most customers would otherwise pay. This has been the case in the CPE and long-distance markets, and we would expect that competition in local exchange service will, on an overall basis, eventually have similar salutary results”.

It does appear, however, that the price rebalancing which competition will accelerate can increase connection and rental charges and thereby accentuate the problems some disadvantaged groups face in affording telecommunication access and usage. This problem is already being recognised.
and addressed in the United States, the United Kingdom, Australia and other countries which have liberalised their telecommunication markets. There are now in place various schemes and regulatory measures to assist telephone connection and usage among disadvantaged groups in order that universal service can continue to be pursued in a competitive environment. The next chapter of this report proceeds to examine these schemes.

### Table III.4. BT's quality of service

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</thead>
<tbody>
<tr>
<td><strong>Network reliability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local calls failed %</td>
<td>2.0</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>1.6</td>
<td>1.1</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>National calls failed %</td>
<td>4.4</td>
<td>4.1</td>
<td>4.3</td>
<td>4.2</td>
<td>3.0</td>
<td>1.7</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Network faults per line per annum</td>
<td>n.a.</td>
<td>0.20</td>
<td>0.19</td>
<td>0.22</td>
<td>0.20</td>
<td>0.20</td>
<td>0.18</td>
<td>0.16</td>
</tr>
<tr>
<td><strong>Fault repair</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fault cleared within 2 working days %</td>
<td>n.a.</td>
<td>87.1</td>
<td>83.2</td>
<td>83.3</td>
<td>92.5</td>
<td>94.4</td>
<td>96.4</td>
<td>99.0</td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business orders completed in 6 working days %</td>
<td>n.a.</td>
<td>60.8</td>
<td>52.8</td>
<td>45.6</td>
<td>56.8</td>
<td>62.6</td>
<td>76.0</td>
<td>75.2</td>
</tr>
<tr>
<td>Residential orders completed in 8 working days %</td>
<td>n.a.</td>
<td>59.4</td>
<td>45.6</td>
<td>39.7</td>
<td>63.3</td>
<td>73.6</td>
<td>81.7</td>
<td>83.2</td>
</tr>
<tr>
<td><strong>Operator service</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inland operator calls answered in 15 seconds %</td>
<td>84.6</td>
<td>85.6</td>
<td>85.2</td>
<td>82.3</td>
<td>84.2</td>
<td>83.7</td>
<td>87.2</td>
<td>90.4</td>
</tr>
<tr>
<td>Inland directory enquiry call answered in 15 seconds %&lt;sup&gt;3&lt;/sup&gt;</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>76.3</td>
<td>83.1</td>
<td>84.5</td>
<td>87.5</td>
<td>94.1</td>
</tr>
</tbody>
</table>

n.a. not available.

1. Estimates were calculated by averaging monthly values. Thus, they may not be accurate to the number of significant digits presented in the table.
3. Before April 1987, the measure related to calls answered in 25 seconds. Statistics on this basis are available only for 1985-86 (74 per cent).

Source: OFTEL, 1992a, p. 15.
IV. MEETING UNIVERSAL SERVICE OBLIGATIONS IN A COMPETITIVE ENVIRONMENT

1. Introduction

As the preceding chapters have emphasised, the basis of a programme to ensure the achievement of universal service objectives should be a policy decision to define transparently and specifically what universal service is, under what conditions it should be made available, and what methodology should be used to estimate and apportion the costs of the stated requirements.

Chapter II was concerned with specifying objectives, and Chapter III with the impacts of market liberalisation on universal service. In turn, Chapter V addresses costing methodology. This chapter focuses on schemes which can be used to deliver universal service where competitive circumstances prevail, drawing on the practices used in various countries. It also discusses an example of an arrangement for apportioning the cost of universal service in a competitive environment.

2. Alternative universal service mechanisms

A number of mechanisms for delivering universal service in a competitive environment can be envisaged. These include:

a) a continuation of broad uniform tariff policies sustained by cross-subsidisation although on a more limited scale;

b) specifically-targeted subsidies paid directly by government and funded by general taxation revenue;

c) specifically-targeted subsidies paid by government, but funded through a universal service levy on all telecommunication users;

d) specifically-targeted schemes with costs borne by the dominant operator (but not by competitors); and
e) specifically-targeted schemes with costs shared among all operators.

These mechanisms for delivering universal service can have significantly different effects on beneficiaries as well as telecommunication operators delivering the service. Indeed, they can have significantly broader social and economic impacts. Accordingly, the selection of an appropriate mechanism (or a combination of mechanisms) should bear in mind these potential effects.

3. Criteria for assessing universal service mechanisms

The criteria which could be used to evaluate the merits of a particular universal service mechanism include:

-- **transparency** -- the mechanism should provide full and clear disclosure of universal service targets and achievements against such targets; it should also provide details of universal service costs and the funding of these costs in order to facilitate assessment and regular review;

-- **equity** -- the mechanism for providing and funding universal service (and its redistributitional implications) should be regarded as fair: people in similar circumstances should be treated similarly (horizontal equity) and people in different circumstances should be treated differently (vertical equity);

-- **efficiency** -- the provision and funding of universal service should have desirable effects in terms of the allocation of the appropriate amount of resources to the production of a service (allocative efficiency), minimising the cost of producing the service (productive efficiency), and the development of new technologies and products (dynamic efficiency);

-- **cost effectiveness** -- the desired effects or objectives of the universal service programme should be achieved at minimum cost;

-- **flexibility** -- the system should have the flexibility to respond quickly to changes;
-- **incentive compatibility with a competitive environment** -- the scheme should be compatible with providing incentives for efficiency within a competitive environment;

-- **predictability** -- the effects of the mechanism should be reasonably predictable, with a minimum of unintended adverse outcomes;

-- **accountability** -- the mechanism used should contribute towards enhanced accountability of the universal service delivery system; and, finally,

-- **the costs of implementation and administration** -- the costs of implementing the scheme should be relatively low.

4. **Assessing alternative mechanisms**

a) **Cross-subsidisation**

Providing universal service through cross-subsidisation has already been discussed at a number of points in this report. In short, under a system of cross-subsidisation, subsidies were broadly distributed with, in some cases, little attention paid either to their actual effectiveness in serving the goal of universal service or to their distorting effects on efficiency and effectiveness in the operation and use of the telecommunication networks.

When subsidies are broadly distributed, the amount of subsidy that can be provided to each person has to be fairly limited and can often be inadequate to assist the really needy. Such inadequate assistance to effect universal service objectives has tended to result from policies which have provided subsidised prices for basic local service to all residential subscribers, from the very wealthy to the very needy.

b) **Direct specifically-targeted subsidies**

By contrast with uniform tariff policies funded by cross-subsidisation, the per-person amount of subsidy possible with a specifically-targeted approach can be substantial, while the total costs of the programme can still be kept relatively small, especially when compared with the costs of the current system of cross-subsidisation.
Moreover, specifically-targeted subsidies funded by government through the use of general taxation revenue score well in terms of the criteria proposed above.

Japan provides an example of this approach. Here, external public subsidies are used to stimulate and support unprofitable services that are considered desirable. For example, in order to promote cellular radio in rural areas, local authorities have used public money (from their own or the central government’s general taxes) to build infrastructure such as antenna sites, which they then offer for rent to the commercial network operators (Glynn, 1992, p.12).

Direct budget funding can be implemented through two approaches: i) a producer subsidy paid to the telecommunication operator for providing the relevant universal service; or ii) a consumer subsidy paid directly to the consumer of the telecommunication service.

i) Payments to the producer

Appropriate contracts with inbuilt incentives for cost-effective delivery can be designed between the client for the service (the government) and the telecommunication operator. An Australian Task Force for National Performance Monitoring of Government Trading Enterprises (1991) concluded strongly in favour of contracts based on arm’s length negotiations between government and the enterprise concerned specifying the type, quantity, quality and cost of the universal service activities required. The Task Force also recommended that the fee paid to an enterprise for delivery of these services should be fully funded and identified in the government's normal budget process.

The advantage of explicit universal service contracts is that it would require a government to make explicit what services or activities it wants a telecommunication operator to undertake. Ideally, the contract for the provision of universal service should be open to competitive tender since, among other things, this would be a means of minimising exaggerated costings (and therefore the costs of provision). If a system is put into place in which the provision of universal service may be transferred from one service provider to another, it would be necessary to establish fair means to transfer embedded plant and other capital.
The universal service contract would separate out an operator's universal service function from its commercial function and would thereby facilitate the evaluation of the operator's economic and commercial performance.

ii) Payments to consumers

A system of vouchers -- in essence a gift of income which may only be spent on specific items -- would be an alternative (or supplement) to cross-subsidies or direct government payments to a telecommunication operator. The advantage of a voucher system is that it can be used to subsidise the consumption of a specific service while retaining an element of consumer choice (where alternative suppliers exist), transparency and non-interference in the commercial activities of the telecommunication operator.

A voucher system could be suitable where there are a number of suppliers of a service which a government wishes to subsidise. It would enable consumption choices to be made between available services and thereby encourage competition between suppliers. Where alternative suppliers do not exist, however, there seems less reason for introducing such a mechanism particularly since the costs (e.g. of administration) of doing so could be high.

Even in this case there are arguably other advantages in paying consumers directly and removing the operator entirely from the subsidies. This would leave the operator free to concentrate on running its business commercially. There would be no need for the government to contract out the universal service. It would also mean that complaints about the level of concession provided to the consumer would be taken up with the responsible party -- the government -- not the operator.

iii) Funding directly from taxation revenue

By contrast with cross-subsidies, direct funding avoids the distortionary effects associated with incorrect pricing of services. Prices can be maintained at levels to reflect costs, in order to encourage efficient resource allocation.

Direct funding from a government's general budget can have other benefits as well:
-- the budgetary allocation will provide a precise measure of the size of the universal service subsidy since, with payments going directly to producers or consumers, the amount of the subsidy is expressed in money terms;

-- an annual budgetary review ensures that universal service targets and programmes will also be regularly reviewed in regard to their continued relevance (compared to when funding is through uncosted and hidden cross-subsidies); and

-- a telecommunication operator can focus on its commercial and economic objectives.

One problem associated with direct budget subsidisation is the possibility of ("excess burden") inefficiencies arising from higher levels of taxation. However, funding through cross-subsidies can also cause allocative distortions because of their narrow funding base and price effects. While the taxation system can introduce price and income distortions of its own, it has a comparatively wider funding base. The size of the distortionary effect depends, of course, on the size of the tax impost and the price or income sensitivity of taxpayers.

Another problem with budget funding could be its administrative cost. Cross-subsidy regimes require minimal administrative control since welfare transfers take place as part of the operation of the pricing system. By contrast, direct subsidies entail higher administrative costs. However, this possibility must be balanced against the wider efficiency gains of direct funding noted above.

c) **Operator funding**

While direct subsidies funded by taxation may be considered superior in principle, in practice, however, budgetary (and political) constraints may prevail in favour of requiring (one or more) telecommunication operators to bear the cost of universal service schemes. This method of funding will also lead to more transparent delivery and costing of universal service.
d) **Levy on users**

An open and specific levy on all telecommunication subscribers could be an alternative way of funding universal service. This approach has been used in the United States where telephone subscribers have a line item on their telephone bills covering the cost of providing telephone services to the disadvantaged. This system of an explicit levy on users requires an estimate of the cost of the universal service so that it can be apportioned to all subscribers.

This option has the advantage of being transparent and is reported to have low administrative costs. It would avoid the need for entry barriers as all users of the service, whatever their source of supply, could be included in recovery of the universal service costs. A report of an inquiry by the Australian Industry Commission (1991) expressed a definite preference for a specific and identifiable levy on all consumers to the present method of cross-subsidisation, particularly when the broader efficiency costs and lack of transparency effects of cross-subsidisation are taken into account. However, this approach would require precise identification of those products and services that would need to be assessed for the purpose of this levy, a task made more difficult by the increasing use of new technologies (that would blur traditional distinctions).

5. **Schemes to reduce barriers to universal service**

Discussion turns now to examine how various countries have addressed the barriers to universal service noted earlier in Chapter III. Schemes used in countries which have introduced a competitive telecommunication market will be of special interest.

As discussed in Chapter III, barriers to universal service are likely to include: a) telephone call prices; b) installation charges; c) rental charges; d) deposit requirements; e) technological infrastructure and service innovations benefiting universal service; f) quality of service; g) disconnection; h) reducing barriers to telecommunication subscription due to disability in regard to access and use; i) addressing factors influencing voluntary non-subscription.

a) **Telephone call prices**

The successful containment or reduction of telecommunication costs and prices will minimise the pool of people who are unable to afford access to a
telephone. Subject to a revenue requirement, most governments have tried to contain (electorally damaging) telecommunication price increases, often through formal or informal agreements between the government and the telecommunication operator, e.g. that price increases do not exceed that country's inflation rate. Where competition is introduced, such price regulation can be continued, indeed strengthened.

In the United Kingdom, the dominant telecommunication operator BT has been subject to price controls since 1984. OFTEL estimates (1992a, p.8) that under the so-called “RPI-X“ price cap formula, the average price change between November 1984 and September 1991 was 17 per cent in nominal terms, and 24 per cent in real terms. National calls at peak and standard rates have decreased by 39 per cent which is equivalent to 61 per cent in real terms. Although the price of local calls has risen by 34 per cent in the peak rate period, in real terms this is equivalent to 14 per cent.

The regulation of telecommunication prices in Australia is also conducted through a version of the RPI-X formula. Moreover, an “accord” reached in 1990 between Telecom Australia and national consumer groups through the Telecom Australia Consumer Council agrees on principles to ensure that:

-- consumers enjoy continuing real price reductions in standard telephone services overall;

-- residential telephone ownership will increase in socio-economic sectors with low access levels;

-- standard telephone services, including usage, are affordable in all residential sectors; and

-- total telephone charges do not increase in real terms for any sector.

As part of the accord, Telecom Australia undertook to conduct research regarding the reasons for non-telephone subscription, the definition of affordability criteria in different customer sectors, and into telephone usage.

b) Connection charges

OFTEL (1992a, p.23) considers that telephone installation charges might be seen either as a charge to cover a specific cost, or as a down payment
on a contract under which, overall, the payments would cover the costs of the service provided. OFTEL considers that both views deserve to have some weight in pricing decisions. Optimal tariffing considerations would take account of consumers' demand responses to alternative tariff structures. Therefore, if consumers prefer lower connection charges, and these preferences are reflected in demand conditions, a good case could be made for maintaining relatively low connection charges. Moreover, if the "externality" factor is important, it would be appropriate on economic grounds to adjust the line rental downward to generate greater membership of the network.

**United Kingdom**

It was disclosed by the United Kingdom White Paper on Telecommunication Policy (DTI, 1991, p. 64) that BT would introduce a scheme for spreading the payment of connection charges over a "reasonable period". The United Kingdom's NCC has suggested that a cheaper installation charge be offered in return for no fixed appointment (an arrangement which might appeal to people who are usually at home).

**United States**

In the United States, a number of schemes exist at both federal and state level to subsidise or encourage telephone penetration. (For a survey of these schemes, see Mitchell and Vogelsang, 1991, Chapter 11.)

Recognising that subscribership is often discouraged by high installation charges (as well as high monthly rates), the FCC adopted a programme in April 1987 to partially offset the impact of these charges. Under the Link Up America scheme, eligible subscribers are provided a Federal Government subsidy to offset one-half of the charges for beginning service, and local telephone companies are encouraged to offer deferred payment plans for the remaining charges.

From January 1990 through June 1990, Link Up America had provided assistance to more than 256,000 subscribers nationwide at the cost of

$5.5 million in reimbursements to local exchange carriers for connection assistance and deferred payments.
c) Rental charge

Concerns have been expressed, however, about the effects of price realigning which resulted in a significant cumulative increase in residential line rentals. OFTEL has assessed the effect of realigning on residential customers through calculations of the change in the bill of the “median” or “typical” residential subscriber. Table IV.1 sets out the movements in the Median Residential Bill and in the constituent components of this quarterly bill. Note that these price increases occurred within the confines of a constraint placed on BT to restrict its price increases such that increases in the Median Residential Bill did not exceed the rate of inflation. Moreover, connection and rental charges were not to increase by more than the rate of inflation plus 2 per cent. Within these broad constraints price realigning was permitted. The effect that price realigning has had in pushing up exchange line rentals is very much in evidence from Table IV.1. The line rental charge which was £13.95 per quarter in 1988-89, increased to £15.35 per quarter in 1989-90 and increased again to £17.13 in 1990-91. It should be noted, however, that overall the median residential subscriber has experienced a decrease in real terms in the size of his bill. (During the period in which it was measured and subject first to informal control, and then from 1 August 1991 to formal control, the Median Residential Bill has risen by 21 per cent, compared with the relevant RPI increase of 26 per cent.)

On the basis of the information available about the increases in connection charges and line rentals, it seems that the problems faced by some groups, especially lower income earners, rural people and people with disabilities, in acquiring and maintaining telecommunication access and usage would be accentuated. Lower income subscribers probably make less long-distance and overseas calls and are therefore likely to be benefiting less from the sharp declines in the prices for such calls which are serving to contain the increase in the size of the overall bill.

OFTEL (1992a, p.23) acknowledges that if BT is provided with the increased flexibility the operator is seeking, that is that it be constrained only by the Median Residential Bill arrangement (without the RPI + 2 per cent cap on connection and rental charges as well), this may not be adequate to protect some vulnerable groups:

"Such an arrangement would give BT the flexibility to adjust its prices towards more economic levels, while protecting ordinary consumers from rises in the real size of their bills. On the other hand, such a control would not protect all vulnerable groups of customers and BT
might, for competitive reasons, attempt to alter the structure of its tariffs in a way which had the effect of disadvantaging some vulnerable customers”.

Table IV.1. **Median residential bill for BT customers**  
(£ per quarter)

<table>
<thead>
<tr>
<th></th>
<th>1988-89</th>
<th>1989-90</th>
<th>1990-91</th>
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<tbody>
<tr>
<td>Connection charges</td>
<td>1.74</td>
<td>1.38</td>
<td>1.38</td>
</tr>
<tr>
<td>Exchange line rental</td>
<td>13.95</td>
<td>15.35</td>
<td>17.13</td>
</tr>
<tr>
<td>Local calls</td>
<td>10.33</td>
<td>10.57</td>
<td>12.04</td>
</tr>
<tr>
<td>National calls (incl. “m” rate)</td>
<td>7.18</td>
<td>8.35</td>
<td>8.25</td>
</tr>
<tr>
<td>International calls</td>
<td>1.36</td>
<td>2.01</td>
<td>1.66</td>
</tr>
<tr>
<td>Total (excl. DQ/IDQ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DQ/IDQ charges</td>
<td>--</td>
<td>--</td>
<td>1.09</td>
</tr>
<tr>
<td>Total</td>
<td>34.56</td>
<td>37.66</td>
<td>41.55</td>
</tr>
</tbody>
</table>

* Directory and International Directory Enquiry Services. The first year charges were levied for enquiry services was in 1990-91.

**Source:** OFTEL (1992a, p. 8).

An alternative approach to maintaining the restrictions on increases in connection charges and line rentals is to provide subsidies specifically directed to needy subscribers.

i) **Low user and “Lifeline” schemes**

The Lifeline programme in the United States provides financial assistance to means-tested low income subscribers, with respect to their monthly telephone payments. It includes a waiver of the federal subscriber line charge, plus a reduction of at least a comparable amount in local charges of some type. The Link Up America programme discussed shortly provides connection assistance so that low income subscribers can defray installation charges. The FCC must approve each state's basic programme, but the states have considerable flexibility in designing the means test and the benefits to be conferred.
The FCC estimates on the basis of data provided by the companies participating in Lifeline assistance programmes (FCC, 1991), that as of October 1990, 2,213,316 low-income subscribers in the United States received reduced rates under the federal Lifeline assistance programme. During the period January 1990 to June 1990, the scheme cost $29.3 million in payments to local exchange companies for end user subscriber line charge waivers. Participation rates for the Lifeline programme vary from state to state, averaging out at 32 per cent of the eligible population. Studies by Makarewicz (1991) and the Aspen Institute (1991) have concluded that the United States schemes have been successful in achieving their universal service objectives.

The federal component of both the Lifeline and Link Up America programmes is funded by indirect taxes on interstate telephone service, while the state component comes from either general tax revenues or specific levies on telecommunication operators.

In the state of California, the Moore Universal Service Act 1983, was passed by the state legislature to protect universal service after distribute of Pacific Bell from AT&T. The target group was low income subscribers rather than low users. In 1987, California introduced a flat rate Lifeline service with unlimited local calls.

The Californian Universal Lifeline Telephone Service offers basic telephone service for 50 per cent of the regular cost. For flat rate service, the charge was $4.18 per month (in 1990), for measured service it was $2.23 per month. In 1990, about 1.3 million or approximately 15 per cent of residential customers were Lifeline subscribers.

Pacific Bell does not lose money on Lifeline customers since the balance between Lifeline rates and regular rates is refunded from the Universal Service Fund, administered by the California Public Utilities Commission. This Universal Service Fund is maintained by a surcharge of 3.4 per cent on all non-local calls within California (with all subscribers, business and residential, including Lifeline customers, paying the surcharge). The surcharge is intended to be levied on all local calls carried by all providers, although it is difficult for the state to know what alternative methods of carriage exist.

United Kingdom

OFTEL's Director-General [United Kingdom White Paper (DTI, 1991, pp. 62-63)], while acknowledging concern about the potential impact that higher
rental charges could have on telephone subscription, appears to discount the significance of such impact in practice:

"If these (higher standing charges) were to cause a large number of people to give up the telephone, the negative effect on the value of the telephone network would be very high. Not only would we have to count the loss of value for the people who leave the telephone network but also the loss of value resulting from the fact that people who continue to be members of the network would no longer be able to telephone those who had left".

However, the Director-General considers that the evidence suggests that most people would not discontinue subscribership of the telephone network as a result of an increase in prices due to price-rebalancing.

Nevertheless, the Director-General has exerted pressure on BT to introduce schemes to ensure that low or "lifeline" users of the telephone who need the telephone for emergency purposes and who receive rather than make calls are insulated from sharp price increases.

Earlier schemes to aid low users have now been replaced by BT's Supportline programme, which offers those low-users who opt into the scheme a 50 per cent reduction on the normal quarterly rental and 30 free units of usage per quarter. A higher than standard price is charged for all further call units, bringing the point of break-even with the standard tariff to 120 units per quarter. Figure IV.1 illustrates the operation of the United Kingdom's Supportline scheme.

The low-user schemes are aimed at those who need the telephone for emergency purposes or who receive rather than make calls. In the latter case, the treatment of incoming call revenue is particularly important in establishing the cost to the operator of running such schemes.

The United Kingdom's National Consumer Council (NCC, 1991, p.13) has criticised BT's low-user schemes as being "restrictive and inadequate":

"The Supportline scheme offers a set amount of free units which represent, for example, just under 29 minutes of peak local calls or 13.5 minutes of peak short-distance national calls. These time periods can be used up very quickly when, for instance, someone has to contact a number of advice agencies or arrange hospital appointments, or simply speak to relatives. Moreover, the scheme is complicated and
confusing. It is not at all clear how customers are meant to know when they are approaching the usage limit, above which they will incur a penalty. Far more imaginative measures are needed to help people who are low users through choice but also to encourage greater telephone penetration and use”.

The NCC suggested that:

a) consideration be given to offering lower rentals for limited service options (such as incoming calls only, with no ability to make international calls or premium service calls);

b) arrangements for “gift packages” enabling a donor to pay the rental component of a subscriber's bill be designed so that relatives can assist the subscriber to maintain connection to the network;

c) a return to reduced rates for local loops shared among neighbours be considered.

ii) Payphones

Some respondents to the UK Government's 1990 Consultative Document (DTI, 1990), pointed out that competition to provide and manage public payphones was now quite strong in the United Kingdom particularly in urban areas. However, call-boxes in rural areas are under greater risk as the development of mobile services further erodes the use of some payphones. Some concern was expressed about the prospect of an increasing number of removals of uneconomic call-boxes in rural areas. Several respondents suggested that access charges should be considered as a possible means of funding uneconomic call-boxes where they were deemed to serve a social need. In fact, there is already provision for such access charges within BT's licence.

Again this problem could be addressed by specific requirements on operators. In the United Kingdom, the Government's 1991 White Paper specifically required OFTEL to keep the call-box situation under review, particularly in regard to those call-boxes in rural areas that provide an important service to local communities. BT has evidently given OFTEL an undertaking that it would not close any call-boxes on the basis solely of low revenue without first discussing with OFTEL alternative arrangements for meeting their cost.¹
d) Deposit charge

The NCC has suggested that a new customer be allowed to offer a guarantor rather than be forced to pay a deposit.

e) Technological and service innovations benefiting universal service

Chapter III has discussed the ways that competition can generate incentives for technological and service innovations, some of which could benefit universal service.

There is a view, however, that the potentially widespread benefits of telecommunication infrastructure development are more likely to be achieved if there are deliberate regulatory efforts towards this end. Closer monitoring of the beneficiaries of telecommunication infrastructure investment programmes could be conducted to try to ensure that it is customers in general -- including universal service beneficiaries -- and not just or predominantly large businesses and high revenue users (whose niche-market custom will be primarily sought out by innovators) who are reaping the benefits.
For instance, in the United States, the District of Columbia Public Service Commission has announced decisions which indicate the growing concern that telecommunication infrastructure investments, which are in effect funded by all customers, result in benefits spread broadly to all customers. In deciding to initiate a new proceeding to examine the Chesapeake and Potomac Telephone Company's (C&P) construction budget and programme, the PSC stated (PSC, 1992), that it would investigate C&P's long-range construction plans in order to see:

-- what income levels of customers would be affected by various projects;

-- what income levels of customers would pay for the projects;

-- what geographic sectors of the city would be affected;

-- what classes of customers the projects are intended to serve;

-- how residential and business exchange access service would be affected; and

-- how the C&P's quality of service would be affected by the construction programme.

\( f \) Quality of service

At present few telephone operators publish quality of service statistics in a systematic manner. However, there are signs -- at least in some countries -- that regulatory pressures to do so are increasing. The absence of systematically provided quality of service data permits selective reporting of quality of service statistics by telephone operators in advertising literature which can give a misleading impression of quality. In essence, the need is for greater transparency in the reporting of quality statistics and for more formal mechanisms for handling customer account queries.

As noted in Chapter III, there seems little doubt that competition has served to improve quality of service for large business users. Indeed, it is becoming increasingly common for telecommunication operators to establish formal contracts on service quality with their leading customers, with specified penalties for failure to deliver.
Ensuring that quality of service for the low-revenue, marginally or unprofitable customers (who are the predominant beneficiaries of universal service obligations) also improves or at least does not deteriorate may be quite another matter. To ensure that quality of service for such subscribers is maintained may require formal processes of regulatory monitoring and assessment.

i) **OFTEL's approach to regulating BT's quality of service**

Recognising that there is a danger of quality deterioration at least in certain circumstances and areas, OFTEL required BT in October 1987 to introduce regular six monthly reports based on measurements of its quality of service. The reports have expanded over time and now cover one or more indicators in each of the following areas: network reliability (call success rates and network faults per line per annum), the speed of response on operator services, serviceability of public payphones and various indicators relating to its private circuits business. As noted in Chapter II, the surveys have generally shown an upward trend in BT's quality of service.

ii) **Financial compensation schemes**

In 1989, BT introduced a customer compensation scheme under which it undertook to compensate customers if certain contractual standards are not met (e.g. installation and repairs targets). For residential customers, compensation is one month's network rental charge for each day that BT falls short of its installation and repair targets, including weekends. For business customers, the compensation is now £25 per line for each day BT falls short of its target. BT's Customer Service Guarantee Scheme first introduced during 1989 was expanded in 1991 to cover a wider range of services, and now commits BT to agreed dates for installation and to faster repair times, and allows customers four months in which to register their claim (BT, 1991b).

iii) **The United Kingdom Competition and Service (Utilities) Act 1992**

In the United Kingdom, provisions in the *Competition and Service (Utilities) Act 1992* have strengthened the powers of the Directors General of Telecommunications, Gas Supply, Electricity Supply and Water Services. In essence, the Act empowers the Director General of Telecommunications (DG) to set standards of service to be achieved in individual cases, to determine
compensation, and to set standards for overall performance. The legislation also requires that research be carried out amongst consumers before these standards are agreed upon. The provisions of this unique consumer protection Act will be of wide interest and are therefore worth elaborating on.

Clauses one to eight of the Act amend the Telecommunications Act 1984. Clause one gives the DG power to set standards of service to be achieved in individual cases and to determine compensation where those standards are not met, and to set standards of overall performance. Clause two obliges the DG to collect and publish information about levels of performance achieved in relation to those standards. A designated operator who fails to provide any information required by the DG is liable to a fine not exceeding £2,000. Clause three obliges a designated operator to inform customers, at least once a year, of the overall performance standards set by the DG and of the level of achievement in regard to those standards.

Clause four obliges a designated operator to establish and publicise a procedure for dealing with customers' complaints.

Clauses five, six and seven relate to the determination by the DG of certain disputes between designated operators and customers. Clause five gives the DG power to determine disputes about the setting of charges for relevant services. By Clause six, the British Secretary of State may make regulations giving the DG power to determine disputes about the accuracy of bills. Provision is made to avoid a matter being the subject of court proceedings. Clause seven gives the DG power to determine disputes about requirements to pay deposits before receiving services.

Clause eight provides that a designated operator may not disconnect a customer for a failure to pay charges where there is a genuine dispute concerning the amount of those charges.

The United Kingdom National Consumer Council considers that since the operators need to make these quality of service measurements for their own purposes, it may not be justifiable (in terms of a comparison of additional benefits against additional costs required) to insist also on a full set of independent measurements (NCC, 1991, p. 23). However, the Consumer Council urges that all quality of service indicators should be subject to independent audit and cross-checking with information provided from outside surveys (such as those commissioned by OFTEL and the Consumers' Association). The coverage of the quality of service measurement is also important:
"We believe that indicators should be publicly available for the smallest geographical or network units for which they are statistically valid. They should also be made available at the greatest frequency over which variations are meaningful (typically between one and six monthly)... One important job for local consumer groups would be to scrutinise the quality of service indicators for their own area. They would be able to compare these with those for other areas and discuss them with local telephone company managers". (p. 24)

Clearly, to ensure that the quality of service provided to universal service customers (including low income and subscribers in thinly populated areas) receive due attention, the quality performance measures should specifically include services provided to them. In particular, the overall quality of service indicators should be complemented by indicators of service quality to and from specific (e.g. rural or remote) areas. This measure was specifically recommended by the report of the Swedish Postal and Telecommunications Commission (POST, 1990).

In Australia, the Telecommunications Act 1991 gave Austel, the telecommunication regulator, the function of developing, monitoring and reporting on the quality of service provided by the telecommunication carriers.

In 1990, Telecom Corporation of New Zealand agreed to a request from the Minister of Consumer Affairs to publish quality of service indicator for the residential service.

iv) European conference of PTTs

The European Conference of PTTs (CEPT) is reportedly (Telecom Markets, 20 February 1992, p. 4) preparing to publish twice-yearly reports on the quality of service provided by its members for international and domestic telecommunication services. From the middle of 1992 the organisation aims to produce figures that give telecommunication users an indication of the average length of time needed for national telephone operators to install and carry out maintenance for telephone, telex and leased line services across Europe. The reports would serve to provide users with a means of comparing operator performance.

The publication of such Europe-wide figures would be a considerable step forward since (according to a report in Telecom Markets, 20 February 1992) BT in the United Kingdom and Norwegian Telecom are the only two operators
in Europe to publish quality of service reports, with Telecom Netherlands to follow shortly.

The pressure for CEPT to act in regard to international comparisons has reportedly come from user groups, such as the International Telecommunications Users Group (Intug), and from proposed EC legislation that has urged national regulatory authorities to set and publish targets for supply times, such as fault repair time and call-failure rates for national, international, intra-European Community and extra-Community calls.

A key problem concerning the assessment of operator performance in regard to quality of service is that such figures are currently compiled according to their own individual targets, rather than according to measures that take into account user requirements, particularly those of residential users.

Another problem is the provision of misleading information. The CEPT considers, however, that it would be able to detect attempts by operators to doctor returns to produce a false impression of performance. For instance, in regard to international calls, it believes that irregularities will be exposed by the submissions from other operators which record the faults encountered when connecting users from one country to those in another.

g) Disconnection

No clear evidence is available about how competition has affected disconnections. The threat of disconnection appears to be a significant concern of low income subscribers and it is important therefore that statistics of disconnections from the telecommunication network be published on a regular basis to allow trends to be monitored.

As the National Consumer Council (1991, p.18) points out, other regulated utilities in the United Kingdom (e.g. water and electricity) publish disconnection statistics and telecommunication operators should be obliged to do so as well. Moreover, the NCC urges that:

"BT should be placed under a duty to publish the detailed procedures that it follows before disconnecting for non-payment, together with information to customers about options open to them at each stage for avoiding disconnection. These options should include the possibility of staged payment arrangements, more frequent billing, or converting to pre-payment service. If disconnection is allowed under the Code of
Practice, the customer should still be able to retain use of the telephone for emergency services and for incoming calls. Customers whose failure to pay results from real financial difficulties, and who have entered into a regular payment agreement, should not have their problems compounded by being charged for reconnection. Customers who have been disconnected in error should receive generous compensation for each day when their line was not working”.

The new British *Competition and Service (Utilities) Act 1992* will ensure that customers who are in genuine dispute are not disconnected. The Act will also provide the Director General with more powers concerning the protection of consumer interests and, as noted earlier in Chapter III, the Director General has already indicated the intention to undertake a full consideration of disconnection policy.

**h) Concern for disability in regard to telecommunication access and use**

The special attention to the disabled need not diminish within a competitive environment. Indeed, some telecommunication operators in competitive circumstances have voluntarily expanded assistance to the disabled. Where further assistance is required, the delivery of such assistance to facilitate the telecommunication access and use by the disabled and elderly can be specifically mandated of telecommunication operators (*e.g.* in the legislation governing licence conditions). There are already several examples of this.

*United Kingdom*

In the United Kingdom, the telecommunication legislation makes specific reference to the provision of service to overcome the difficulties experienced by those with disabilities in gaining access to a telephone service. Section 3(1)(a) of the Telecommunications Act 1984 gives the Secretary of State and the Director General a duty to exercise their functions in a manner best calculated to:

“...promote the interests of consumers, purchasers and other users in the United Kingdom (including, in particular, those who are disabled or of pensionable age) in respect of the prices charged for, and the quality and variety of, telecommunication services provided and telecommunication apparatus supplied”.

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Section 8 (2) of the Act further stipulates that, where a service provider is required under the service licence to offer directory information services, the licence conditions shall be taken to include:

"...a condition requiring that person to provide without charge for subscribers who are blind or otherwise disabled such directory information services to which this subsection applies as are appropriate to meet the needs of those subscribers and are specified in the licence or are of a description so specified".

The Director General, under section 54(4), is also to establish as soon as practicable an advisory body for "matters affecting persons who are disabled or of pensionable age". Since the legislation was introduced, the British regulatory body OFTEL has established advisory committees, including the Advisory Committee on Telecommunications for Disabled and Elderly People.

An example of a scheme which provides financial assistance to the profoundly deaf and speech impaired so that these people can communicate over telephone networks by using text terminals is the so-called Text Help Scheme.

Under this scheme, those registered will be reimbursed for 60 per cent of their telephone call charges up to a maximum of £160 a year. The scheme is being financed by donations to the Royal National Institute for the Deaf, by British Telecom and the Government.

Another example of the way a telecommunication operator in competitive circumstances has assisted people with physical disabilities to be connected to the telephone network was publicised recently by the British Royal National Institute for Deaf People (RNID) in a letter to the Financial Times (5 May 1992, p.19). Evidently, BT of its own volition has contributed £4 million towards establishing a national telephone relay service known as TYPETALK to assist deaf, deafened, deaf-blind, hard of hearing and speech impaired people, who rely on the use of text terminals to communicate with third parties over the telephone network. The basis of the service is for a central operator to transcribe text from a deaf person's text telephone into speech and speech into text. The system is also capable of having the text translated into Braille where appropriate.

These examples have been worth recounting because they demonstrate that continued assistance to the disabled can occur under competition.
United States

The United States also offers many examples of specific programmes for meeting the telephone needs of the physically handicapped. In 1982, Congress passed the Telecommunications for the Disabled Act to provide the hearing-impaired and other handicapped persons with inexpensive access to the telephone network. Under the Act, the FCC was required to:

a) establish regulations to ensure reasonable access to telephone service for the hearing impaired;

b) establish regulations requiring that certain categories of telephones designated “essential” be internally compatible with hearing aids specially designed for telephone use;

c) adopt technical standards which will effectuate the above regulations;

d) establish requirements for labelling telephone packaging to inform customers whether a telephone is compatible with hearing aids;

e) adopt rules to allow carriers to provide “specialised terminal equipment” (i.e. CPE) to persons with hearing, sight, speech and mobility impairments, and permit state commissions to allow carriers to recover in tariffs for communications services “reasonable and prudent costs not charged directly to users of such equipment”.

In 1988, Congress amended the Telecommunications for the Disabled Act to require that most telephones manufactured in the United States or imported for use in the United States be hearing aid compatible by 16 August 1989. Finally, the 1990 Americans with Disabilities Act required all common carriers providing telephone services to implement telecommunications devices for the deaf (TDD) by July 1993 in terms of providing relay systems that comply with FCC standards.

Australia

In Australia, AOTC has itself undertaken to continue to provide support and assistance to certain community and disadvantaged groups although this was not mandated as part of its universal service obligations. These
measures include a one third reduction of rental to charitable organisations and the provision of specialised telecommunication facilities at no extra cost to people with disabilities. AOTC has established a Disability Programs Unit in each capital city to develop specialised equipment to meet particular needs of the disabled. Such equipment is made available to those with physical disabilities at the price of a handset.

i) Factors affecting voluntary non-subscription

There are a significant number of people who might be considered to be voluntary non-subscribers to the telecommunication service. The concern for universal service demands that the community does not therefore simply wash its hands of them. There should be far more information available about the reasons for such “voluntary” non-subscribership and, if necessary, how these reasons can be addressed. Nuisance calls could be addressed by caller identification, etc. Services such as “chatlines” which can lead to significant telephone bills may have led some subscribers to disconnect. Here too the problem can be addressed by regulation. Indeed, the United Kingdom’s Director General of Telecommunications has recently disallowed the operation of chatlines in Britain. However, movement in this direction could imprudently impinge upon the right of free speech.

Far more research including surveys of people without telephones is necessary to generate the requisite information. As the United Kingdom National Consumer Council has pointed out:

“...no surveys have yet studied why households are not on the phone. We do not know how big a factor costs are, nor which elements of costs (connection charge, rental or call charges) loom largest to whom. Such information is essential for designing sensible schemes to meet real needs” (p.29).

6. Sharing the costs of universal service in a competitive environment

Australia

A process of establishing long-term arrangements for attributing and sharing the cost of universal service obligations among competitors was established in Australia under the Telecommunications Act 1991. The Australian arrangements are of particular interest because they involve not
merely the sharing of costs for universal service obligations, but because they also allow some degree of competition for the right to discharge them.

In Australia, the “proscribed carrier obligations” under the Telecommunications Act 1991 require general carriers to give all residential customers the option of having untimed local calls (that is, where the charge for a local call is unrelated to the duration of the call) and free access to emergency calls. The prescribed carrier obligations also include a “universal service obligations” (USO), to ensure that the standard telephone service and payphones are reasonably accessible to all Australians, wherever they live or work.

The USO can apply either for the whole of Australia or for part of it and different carriers could be declared for different parts. However, currently, the Australian and Overseas Telecommunications Corporation (AOTC), has been declared by the Minister as the universal service carrier for the whole of Australia. This means that AOTC must ensure that the USO is fulfilled for the whole of Australia. The costs incurred by AOTC in meeting the USO will be shared by all carriers, in proportion to their share of the market.

The universal service carrier can then -- at the beginning of the financial year -- nominate “net cost areas” (i.e. areas where universal service obligations impose losses) to the industry regulator AUSTEL. Areas nominated can be small, but the costs of nominating small areas and supplying the necessary data to sustain the case that they are in deficit is considered likely to discourage the identification of isolated groups of customers (or individual payphones) as net cost areas.

Once the areas have been nominated, AUSTEL then calculates the cost of the universal service obligation, using the avoidable cost method explicitly described in the Telecommunications Act, 1991. The total cost is then divided up amongst participating carriers in proportion to share of timed traffic. Thus initially, the second carrier will pay AOTC a proportion of the cost of universal service equal to its share of the total traffic passing between the trunk and international network and all local access networks. (Note that shares are based on relative traffic shares, not on the profitability of traffic.)

The Act requires the regulatory body to publish the results of its calculations. This is designed to give the second or subsequent carriers access to information on all claims made for compensation by AOTC. Hence OPTUS would be able to gauge whether it could deliver services more efficiently or effectively in any net cost area. If it believes that it can provide the services more cheaply than AOTC, it could bid for the right and, if successful in
convincing the Government, be declared the universal service carrier in that particular area. In this event AOTC would have to compensate OPTUS for providing the universal service. The system thus makes the supply of universal service “contestable”.

Under the legislation, AUSTEL will also have the power to direct carriers to fulfil their prescribed carrier obligations. Where it is alleged that the universal service requirement was being breached in a particular service area, AUSTEL could require AOTC to defend itself against this accusation.

The Australian approach obviously requires a precise estimate of the costs of the universal service activities which are to be divided among the competing suppliers. In other countries where such estimates are not available another method of financing deficits has been developed which achieves a similar effect in identifying and sharing the cost of cross-subsidies.

This alternative method proceeds by identifying not loss-making customers but loss-making services. Because losses incurred by particular services tip particular customers (which consume those services disproportionately) into unprofitability, sharing the cost of losses on particular services is an indirect way of sharing the cost of losses imposed by individual subscribers. The practice of averaging losses with profits that can be achieved relatively easily in a monopoly setting may be more difficult in a market where entrants can offer a given service wherever they choose.

**United Kingdom**

In the United Kingdom there is provision in the legislation for sharing the cost of universal service through the system of “access charges”. However the system has not yet been called into use. One reason for this appears to be the Government's attitude [United Kingdom White Paper (DTI, 1991, p.72)] that it is desirable to give new entrants an advantage by not imposing a universal service requirement upon them:

“The benefits of competition are so great that it is desirable for the regulations to assist the entry of new operators. This can be done by giving new entrants a discount on interconnection arrangements or by giving the original monopolist a universal service obligation at a uniform tariff while the new entrant can pick and choose the services it will provide with more pricing flexibility -- it can engage in “cream
skimming”. These approaches have been used in the United Kingdom to some extent over the last ten years”.

Pointing out that it does have a number of loss making customers “on an incremental cost and revenue basis” and that it incurs losses in providing payphone lines and the 999 service, BT has given notice that if the burden of universal service becomes significant, BT would expect it to be shared by its competitors (BT, 1991a, p.12). However, BT considered (BT, 1991a,p.62) that:

“The introduction of flexible pricing, proper pricing of interconnect and further rebalancing will reduce the size of BT's losses due to 'social telephony'. Once the above measures have been implemented, the need for any residual access charge to cover the cost of BT's social obligations can be addressed”.

There could be some threat to universal service in a policy of exempting competitors from sharing in the cost of universal service. First, the incumbent provider would naturally resent the “unfair” burden placed upon it and might accordingly attempt to minimise the delivery of universal service obligations. Second, the intention to level the playing field later when competition is stronger could prove difficult to effect since, once entrenched, the new competitors would probably be more effective in resisting the “mill-stone” of non-profitable social obligations. The best time to embed specifically articulated obligations is probably at the outset, before competition is entrenched, when the terms of the licence contract are most negotiable.

Japan

In Japan, NTT is charged with providing telecommunication services nationwide, which is not the case for the other private operators, as stipulated in article 2 of the NTT law. Concerning emergency services, including fire and ambulance services etc., all telecommunications operators are obliged to perform such services, as a first priority, as stipulated in article 8 of the Telecommunications Business Law. With regard to various services for the disabled, all telecommunications operators may reduce or exempt charges in accordance with their tariffs, as stipulated in article 31 of the Telecommunications Business Law.

After liberalisation of telecommunication services and the privatisation of NTT, the reduction of charges for the disabled and free directory service have been gradually abolished. In Japan, there is a consensus that special services for
the disabled should not be the burden of telecommunication operators, but rather should be dealt with through governmental assistance from tax income.

Emergency services and special services for the disabled are an obligation common to all telecommunication operators, and the administration may take account of the universal service cost estimates in authorising their tariffs. As for the geographic obligation which is imposed only on NTT, the cost estimates and sharing of the burden of universal service will be a crucial problem which will need to be considered in the near future.
V. COSTING UNIVERSAL SERVICE OBLIGATIONS

1. Introduction

In countries where competition has been introduced in telecommunication markets, some thought has been given to ways of financing the costs of universal service obligations in ways which are consistent with striking a desirable balance between the needs of consumers, the interests of the incumbent provider and the benefits of competitive entry. The precise method employed varies from country to country, but is likely to involve directly or indirectly the carriers providing service. This may require an explicit calculation of the total cost of universal service and the subsequent transfer of substantial sums of money to compensate for its unequal incidence among operators. Alternatively, it may involve the adjustment of interconnection payments made by an entrant for use of the incumbent's network to make some allowance for loss making customers or services, or particular categories of customers targeted by universal service may receive subsidies which they can direct to a chosen operator. Other forms of compensation are also possible.

These methods will involve fairly sophisticated computations to calculate the size of losses and to apportion them, but any such calculations should be based upon a clear understanding of the conceptual difficulties in the way of calculating costs of universal service and an understanding of how any scheme of apportionment affects the market shares and relative profitability of an incumbent and entrant.

These issues are the subject of this chapter. The next section considers alternative concepts and procedures used for cost allocation in the telecommunications industry. Then Section V.3 discusses the conceptual problems associated with the allocation of revenues which must be resolved in order to establish the net costs of universal service obligations. This is followed in Section V.4 with an account of the most detailed realisation to date of a costing exercise for universal service carried out in Australia in 1989. Finally, Section V.5 contains the chapter's conclusions.
2. Classification of costs and methods of cost allocation

It is important first to establish a lexicon of cost-related terminology and use it to describe alternative methods of cost allocation. This is done in the present section. Most studies of cost allocation within telecommunication have focused upon the attribution of costs to different services -- access, local calls, long-distance calls, international calls, etc. -- within the context of uniform prices for each service. In the case of direct costing of universal service, the task is to attribute costs to particular subscribers or groups of subscribers. But the conceptual approaches which can be taken to both problems are similar.

a) Classification of costs

The total cost of producing a particular set of outputs or providing services to a group of subscribers can be broken down into a fixed component (which is independent of the level of output) and a variable component, the size of which depends on output levels. As the time horizon expands, of course, the extent of the fixed component is reduced; in the very long run, all costs are variable.

When the output level and the costs of producing it can be established, average fixed, average variable and average total costs can be computed. These will vary with the level of output. In addition, it may be possible to calculate at any output level the marginal cost of producing an additional unit (connecting an additional subscriber or making an extra call). The marginal cost will depend on what freedom the firm has to vary its inputs. Short-run marginal cost is calculated on the basis of a given level of fixed factors. Long-run marginal cost is calculated on the assumption that inputs of all kinds can be varied.

When a firm is producing a range of goods, some of its costs are assigned or attributed to a particular service or subscriber in the sense that its production "causes" the costs. Others may be common costs or joint costs for a number of different services or subscribers (see below for the distinction). If a firm withdraws from serving a particular subscriber or group of them it will spare itself the avoidable costs. These will differ in the long run and in the short-run. If it expands its activities by connecting new subscribers it will incur an incremental cost of so doing. (In the long run when all possible adjustments are made, incremental and avoidable costs are the same.) The incremental cost shows the extra expenditure incurred by adding new subscribers to a given pre-existing number; for some purposes it may be useful to express it in per unit terms, when it is an approximation to marginal cost. Contrasted to
incremental cost is the stand-alone cost of providing service to a single subscriber or (more sensibly) group of subscribers. Finally, an operator may through its activities impose an external cost or benefit on other households or firms, if its operations impinge directly (i.e. other than through a market-mediated transaction) on others. Thus in providing a connection to an additional subscriber, a telephone company confers an external benefit on existing subscribers, who can now contact an extra person.

The cost allocation problem would be trivial in a world with the following properties:

a) no joint or common costs;

b) marginal and average cost equal;

c) instantaneous adjustment of all inputs;

d) complete information.

With no joint or common costs a), all inputs could with certainty d) be allocated exhaustively to services or subscribers, using either average or marginal data b); there would be no long-run/short-run distinction c).

In practice none of these conditions applies. Most utilities are based upon a network, characterised by the presence of substantial joint and common costs. Joint costs arise when two outputs are of necessity produced together (such as mutton and wool); common costs occur when the same input is used to produce several different outputs but possibly in different proportions (such as telephone cable used to deliver both local and long-distance calls, or a local loop connecting different subscribers).

Common and joint costs are a headache to regulators, but a boon to consumers who are able to benefit from the economies of scale and scope. Indeed, attempts to eliminate common costs by requiring "separations" -- the establishing of quite separate inputs for individual services or groups of services -- have been rejected or abandoned in part because of their expense and inefficiency.

There is general agreement that the extreme case of joint costs where there is no scope for substitution between outputs creates an insoluble problem for cost allocation. Where substitution is possible, as is the case of common
costs of producing the two or more outputs in variable proportions, the prospects are better.

The eminent American expert on regulation, Alfred Kahn, has expressed it thus:

"The fact that most services are typically provided in combinations, using the same facilities, does not mean that definable shares of the common costs cannot in principle be causally attributed to each. When the same equipment may be used to make products A and B, and when producing A uses capacity that could otherwise be used to supply B, then we may speak of their costs as common instead of joint: and in this event, the marginal cost of A may include an identifiable part of these common costs. This situation is widespread in the public utilities, and in industry generally. The same railway plant can be used for passenger or freight service, and for any number of kinds of freight, over any number of routes. The same coaxial cable may transmit telephone messages, business data, or TV programs. The same warehouse may be used to store a variety of products. If any one of these products or services uses freight cars, circuits, or warehouse space that would in fact otherwise be used for one of the others, or if it requires the construction of greater capacity than would otherwise be necessary, then it does bear a causal responsibility for a share of common capacity costs. The cost allocation formulae actually employed may achieve only a rough, rule-of-thumb approximation to the actual costs for which each product or service is responsible, but those costs have objective reality." (Kahn, 1970, p. 78).

To summarise then, as far as pure "joint costs" are concerned, there is no scope for full cost allocation among different subscribers. Where common costs are concerned, the prospects are better. And in either case incremental or avoidable costs can often be estimated.

b) Cost allocation procedures

The aim of this section is to describe a number of cost allocation procedures and identify their properties. Effectively, the allocation procedures to be considered are based upon permutations of the building blocks identified above -- especially attributable cost, incremental cost, avoidable cost, and stand-alone cost. For reasons of space, only the most significant or influential
procedures are reviewed (for a fuller review, see Brown and Sibley 1986, pp. 44-58 or Young, 1985).

\[i)\quad \text{Fully distributed costs (FDC)}\]

By far the most common procedure for cost allocation adopted both by telecommunications operators for their own internal purposes and by regulatory bodies is fully distributed costs. This involves the breakdown of costs into those which can be directly attributed (in the cost-causative sense) to a particular service or subscriber and into a residual or common cost which cannot be so assigned. Each unit is then assigned a portion of the common cost. This, together with its directly attributable cost, determines its fully distributed costs. In setting prices for services the regulator often seeks to ensure that revenues for any service equal the cost figure given by the sum of its attributable cost \((A_i)\) and its share of the common costs \((CC)\). The fully distributed cost of unit \(i\) \((FDC_i)\) can be written as:

\[
FDC_i = \text{Attributable Cost of } i + f_i \times \text{Common Cost}
\]

\[
FDC_i = A_i + f_iCC
\]

where the common cost shares \((f_i)\)'s sum to unity over all units and the problem is how to choose them appropriately. One very crude way is simply to divide the common costs equally, such as one third each to access, local and long-distance calls or spread evenly over all subscribers. Beyond this simple approach the four main candidates for establishing the \(f_i\) are in accordance with:

\[\begin{align*}
a) \text{ Relative output: common costs are allocated to each unit in proportion to its proportion of output in physical units (e.g. call minutes, in the case of use of a telephone system);} \\
b) \text{ Gross revenue: common costs are allocated to each unit in proportion to its contribution to gross revenue;} \\
c) \text{ Net revenue: common costs are attributed to each unit in proportion to its contribution to net revenue (after deduction of interconnection costs, etc.);} \\
d) \text{ Attributable costs: common costs are allocated to each unit in proportion to its share of directly attributable costs.}
\end{align*}\]
Note that a) is only feasible when all outputs can be expressed in terms of a common physical unit. It is also true that b) and c) allocate common costs in accordance with some definition of revenue -- and hence of prices. If such cost allocations are used to establish prices, the argument becomes partly circular.

A further variant of FDC involves the so-called “forward-looking” approach. In this method common capital costs are allocated not on the basis of current relative output or revenue levels but on the basis of expected output levels over the lifetime of the shared asset. In the case of cost allocation among services, the effect of this is to increase the allocation of costs to new services whose current output levels are low but expected to grow. The aim is to prevent mature services “subsidising” emerging services.

Not surprisingly, the various FDC methods give different results, indicating that choice of the principle can affect the outcome. It is partly because of this element of manipulability that economists' criticisms of FDC have been so strong. The main point is the essential arbitrariness of the method chosen: each method will generally give different results, but there is no obvious criterion for picking any one of them. Kahn and Shew (1987, p. 207) forcefully attack the lack of a causal link:

“The only costs that have objective reality are ones that describe a causal relationship between the act of purchase and their incurrence. Cost allocations that are not grounded in causality have no basis in objective reality; they have no meaning independent of the prices they are supposed to justify, except in some ritualistic, incantational sense”.

Secondly, there is no attempt to incorporate marginal or incremental cost or to promote economic efficiency:

“There is obviously not the slightest reason to expect that the prices emerging from a full-costing process will bear the slightest resemblance to those known to be necessary for efficiency in resource utilisation” (Baumol, 1983, p. 181).

The strength of the first criticism depends upon what proportion of costs have to be allocated pro rata. When the US Federal Communications Commission reaffirmed FDC as a means for controlling cross-subsidy between regulated and competitive services, it endorsed the following principles (see GAO, 1988, pp. 32-33):
a) Non-regulated services will pay for any tariffed (regulated) services they use at the tariffed rate.

b) Whenever possible, costs will be directly assigned to either regulated or non-regulated activities.

c) Costs that cannot be directly assigned are called common costs and are grouped into categories and allocated between regulated and non-regulated activities, according to the following hierarchy:

-- Whenever possible, the allocation will be based upon a direct analysis of the origin of the costs themselves. For example, an objective and verifiable measure for allocating the cost of machinery might be hours of use for regulated and non-regulated purposes.

-- When direct analysis is not possible, the allocation will be based on an indirect linkage to another cost category, for which a direct assignment allocation is available. For example the number of purchase orders processed might be an appropriate measure of allocating the cost of a purchasing department.

-- When no direct or indirect allocators are available, the costs should be allocated on the basis of a general allocator computed using the ratio of all expenses directly assigned to either the regulated or non-regulated activities. This category includes such items as general administrative expenses not easily related to specific regulated or non-regulated activities.

The FCC believed that with a well-designed cost allocation system, 80 per cent to 90 per cent of costs can be assigned to particular services on a direct or indirect cost-causative basis. This reduces reliance on the general allocation. As noted above, attempts to break costs down over subscribers (rather than services) are much rarer, and no figure for such a “target” allocation can be given.

BT has also argued that the extent to which its BTs cost allocation system is arbitrary is greatly overstated. BT argues that some costs are directly attributable either to lines or to particular types of call. Others can be indirectly attributed by asking the question: what causes this cost to arise? For example, exchanges are dimensioned according to the numbers of lines and calls, each of
which cause different costs. The proportion of costs that are not causally attributed either directly or indirectly is very small.

A major advantage of FDC is that it corresponds with firms' own internal procedures and thus applying the approach for regulatory processes simplifies the firm's data collection tasks. It has also found some qualified support in accounting theory. FDC cost allocations can be shown to have desirable incentive properties in certain circumstances when the firm's central management lacks information to monitor and control production units (de Ridder, 1989). Nevertheless the charge that FDC does not promote efficient pricing reduces its value for regulatory purposes. Whatever gains are derived from incentives to reduce costs are counterbalanced by inefficient price signals.

But perhaps the major difficulty with FDC is that it can generate a range of possible results, and hence is manipulable. Even when a principle for allocating common costs has been accepted, the outcome depends upon detailed decisions made in implementing the procedure. This is especially true when the subscribers to a telecommunication system are arranged in a hierarchy, with the system as a whole at the top, the individual line at the bottom and local, district and regional exchanges in the middle. In such cases, choices of where in the system causally to attribute costs -- though ostensibly technical -- have a major impact on final allocations. As a consequence, whenever FDC is used in a regulatory context, the regulators must be able to satisfy themselves that appropriate decisions of this kind have been taken in carrying out the allocation.

c) **Historical costs and current costs**

Another feature of costs as commonly defined is that they are often assessed on the basis of an historical cost accounting procedure. This means that assets are entered into the balance sheet at a value equal to the price paid for them at purchase, and depreciation is applied to this value over the expected lifetime of the asset. In times of inflation and/or significant technological change, the historical cost recorded in the accounts in this way can differ, sometimes markedly, from the replacement cost of the same assets. The latter cost reflects the price that would have to be paid for new assets equivalent to those in the balance sheet if they were purchased at the current time.

The historical cost convention has the virtue that there is little room for argument about the valuation of assets, since the prices paid at the time of purchase are a matter of fact and are not subject to adjustment based on subjective judgement. However the historic cost accounting convention also has
a number of deficiencies. The resource costs of assets employed in producing goods and services are accurately measured not by the historic costs of acquiring the assets but by the replacement cost of assets.

In principle, the use of a current cost accounting convention would lead to a more accurate assessment of resource costs. It is true that there are many problems involved in revaluing assets so that they reflect replacement costs. But these problems are not insuperable. For instance, in Australia, the telecommunications operator is required by legislation to revalue assets at least once every five years. So the notorious asset revaluation problems have to be grappled with anyway. In considering the current cost issue, it is pertinent to recall that well known phrase: that current cost accounting leads to measures of cost which are approximately right, while historic cost accounting leads to measures of costs which are precisely wrong! Certainly a start could be made in identifying and publishing current cost estimates since they will at least serve to complement the traditional historical cost estimates.

i) Procedures based on incremental costs and related approaches

The main alternative to FDC in establishing the cost of supplying a service or of connecting a group of subscribers is to use incremental and stand-alone cost as a starting point.

In the case of estimating the cost of universal service obligations, the argument for use of incremental cost is that “profitable” subscribers will have service provided by the operator in any case. Expanding the network to supply others will simply impose incremental costs. Alternatively, withdrawing from supply of such subscribers will only save avoidable or decremental costs. Thus implicitly profitable customers are assigned stand-alone costs and others the incremental or avoidable costs of provision. This “avoidable costs” approach to costing universal service obligations is used in the application discussed in Section V.4 below.

There are, however, other cost allocation procedures which involve permutations of incremental (or avoidable) costs and stand-alone costs, and it is instructive briefly to review them here as they could in principle be used to cost universal service.

Before doing so, however, it is useful to analyse in more detail the notion of “avoidable cost”. Within the context of a telecommunications system, the avoidable costs of a service to a subscriber are those costs which can be
saved if the service is not supplied. For example, if the service is access, the
avoidable costs of the service to a subscriber are the costs no longer incurred if
that subscriber is disconnected. These will clearly differ in the short run and in
the long run. In the short run, when the trench, duct and cabling are already in
place, the avoidable costs are very low. In the long run, over which all assets
have to be replaced, avoidable costs include any costs of connecting the
subscriber to the network as well as any costs of that remaining network which
can be saved if the customer is disconnected.

It is possible to calculate avoidable costs, in the long or short run, of a
single call, of access to a subscriber, of access to a group of subscribers, of
access to all subscribers on an exchange, and so on. In the long run, the
avoidable costs of contracting a service equal the extra cost of expanding to
provide that the service -- its incremental cost. Since most discussion of
universal service obligations concerns problems of funding and maintaining a
basic infrastructure, the long-run approach which includes capital costs is more
appropriate. Thus incremental and avoidable costs are in principle synonymous,
although in practice they may be calculated in different ways and take different
numerical values. Equally, when stand-alone costs (the costs of providing a
single service or group of services to a specified set of subscribers) are
employed in the discussion which follows, long-run stand-alone costs are the
relevant ones. Clearly the total costs of any set of services can be broken down
exhaustively into the stand-alone costs of some and the incremental costs of the
remainder, although the identity of those which stand alone and those which are
incremental depends on the nature of the analysis. Equally, subtracting the
avoidable costs of a group of services from the total cost of a larger set will
yield the stand-alone costs of the survivors.

One method of cost allocation involving these concepts is due to
Moriarity (1975). The method involves determining the minimum alternative
(i.e. stand-alone) cost of supplying each unit independently. The total cost
saving from integrating the system is found by summing the stand-alone costs
for all units and subtracting the costs which are actually incurred. This cost
saving is then allocated to the various units in proportion to their minimum
alternative costs.

The arguments in favour of this approach are as follows:

-- no unit is allocated more than its stand-alone cost;

-- the mechanism requires the firm to establish an explicit alternative
cost for supplying each unit; this may impose an informational
burden but managers have an incentive to identify cheaper forms of stand-alone production as by doing so they will reduce the costs allocated to their service;

-- the procedures may be viewed as “fair” as all units share to some degree in the cost saving.

A disadvantage of the procedure, however, is that it may allocate to a service a cost which is less than its incremental cost of production. If prices are set equal to costs this means that one unit may be subsidised by others.

Another procedure which combines incremental and stand-alone costs is known as the “incremental cost-remaining benefit” approach. Define the difference between stand-alone cost and incremental costs as the “remaining benefit” -- the benefit accruing to a unit from its continued joint provision. Then find the total “remaining benefit” for all units. Each unit is then allocated its incremental cost plus a proportion of the common costs given by its “share” of total “remaining benefit”.

A disadvantage of both these cost allocation procedures is that they are ad hoc, and lack theoretical justification in terms of behaviour and motivation. This charge is avoided by a more thorough-going game-theoretic approach which involves treating the allocation of costs as the outcome of interactions between subscribers (seeking individual connection), all of whom want to minimise their own costs. If they are going to collaborate, the costs allocated to any unit can be no greater than those it would incur if it produced on a stand-alone basis. A more general condition of group rationality requires that the distribution of costs should be such that no agent or coalition of agents could do better (i.e. attain lower costs) by splitting off from the main group. Allocations which meet these conditions are said to be in the “core” of the relevant cost allocation problem (see Brown and Sibley, 1986, pp. 55-59).

In some cases no such allocation may exist; more usually a range of cost allocations can satisfy the conditions. To choose one among them, it is usually necessary to invoke a set of axioms or explicitly to introduce notions of equity and fairness.

A number of procedures exist for doing this. One of the best known involves finding the so-called “Shapley” allocation. This allocation can be shown to satisfy certain desirable axioms such as that all costs must be allocated exhaustively and that any outputs which have the same incremental cost should have the same allocated cost.
Another possible rationalisation of the Shapley allocation is as follows. Suppose that the subscribers connected to the system come together in a random order, and that each of them is charged the incremental cost of its joining the group already connected. Each agent thus pays its incremental cost of being included at the moment of signing up; the allocation therefore depends upon the order in which the agents join.

Before the random joining-up process occurs, the agents may form an expectation of the costs they will be required to bear. This will be the average of all the incremental costs they may impose, including the possibility that they will be the first subscriber and thus incur substantial common costs. This "average incremental cost" is the Shapley allocation.

The relationship between the Shapley allocation and the core is a complex one, but under certain plausible assumptions it can be shown that the Shapley allocation must lie within the core. Although the Shapley allocation has been the subject of a considerable amount of discussion in the accounting literature, its practical implementation has been limited. Moreover, it is based upon one set of axioms, to which not everyone will wish to adhere.

Finally, for completeness, it is useful to mention methods of allocating common costs in proportion to the benefit derived from the customer. Two types of argument can be presented in favour of this approach. The first is based upon equity. The notion here is that it is fair to allocate common costs to subscribers in proportion to the excess of benefit which they derive from them over what they have to pay for them (in other words the consumers' surplus). The same conclusion can also be sustained by an argument based upon efficiency. The principle here is to minimise the impact upon the structure of consumption of prices in excess of marginal costs by loading common costs particularly upon services for which demand is unresponsive to price. According to this argument, for example, it is appropriate to recover most of the common costs in telecommunications by a subscriber access charge because such a policy discourages relatively few subscribers from maintaining their access to the telephone system. If, on the other hand, common costs have been levied mostly on calls, where demand is more responsive to price, the effect of this policy would be to reduce the number of calls undertaken and thus to bring about a greater distortion in the structure of consumption. This principle on pricing was first established in the 1920s by a Cambridge academic, Frank Ramsey, in whose honour it is known as Ramsey pricing. Regulators have however generally shown little appetite for the approach.
3. **Allocating the revenue**

The previous section has identified the two principal approaches to allocating costs to alternative categories of services or customers. However, the costs of a universal service obligation are net costs which arise in cases where revenues for a particular subscriber or class of subscribers fall short of costs. Accordingly, this section considers three issues relating to revenue allocation. These are: estimates of the extent of replacement of calls previously made on a subscriber's line if that subscriber is excluded from the network; the treatment of incoming calls; and the revenue effects of network externalities.

**a) Replacement and the revenue effects of exclusion**

The cost of a universal service obligation can be measured by summing over subscribers any positive differences between the cost of service to a particular line and the revenues lost if the subscriber is excluded from service on that line. The larger the cost allocated to the line and the smaller the revenue lost if the line is terminated, the greater the cost of the USO. At first sight, measurement of revenue lost seems fairly straightforward: it involves simply inspection of the quarterly bills associated with the line. But a subscriber is likely to substitute some of those lost calls with calls made on another line. To the extent that this happens, using the bill to estimate lost revenue overstates it, and understates the cost of the universal service obligation. This phenomenon is illustrated in Figure V.1.

Thus an individual who no longer subscribes to a telephone line at home may continue to make some calls either at his or her place of work, or at a friend's house, or using a pay phone. The extent to which this happens depends upon ease of access to an alternative line, difficulties associated with recompensing -- or not recompensing -- the subscriber to the alternative line and -- if the alternative line is at work -- the feasibility of substituting calls made during working hours for calls made at other times.

There do not seem to be published empirical estimates of the degree of replacement likely to occur, which in any case will vary significantly from one case to another. As telephone penetration has grown, an increasing number of households have been connected to the network, and it would be possible to investigate the extent to which they have substituted calls made on their new lines for calls previously made on other lines, and the extent to which their connection to the network has generated new calls. But the implicit counterfactual needed to answer the question: what is the cost of the universal
service obligation in a world in which de-averaging drives people off the network? There is no certainty that the behaviour associated with a subscriber entering the network would operate in reverse if that person left the network. In the short run at least, recent experience of use of the telephone system may encourage the leaver to pursue alternative opportunities for making calls more vigorously than someone who has never been a subscriber.

The degree of substitution will also be influenced by what is happening elsewhere in the network. A single subscriber in a community who is excluded from the network will continue to have neighbours to call, and neighbours' telephones from which to call. If the abandonment of a universal service obligation meant the exclusion of the whole community from the system, then this substitution could not occur, as the recipients of the calls would no longer be contactable. This illustrates a more general problem in estimating the revenue effects of universal service obligations discussed in the final part of this section.

b) **The treatment of incoming calls**

The revenues to the system associated with a particular subscriber depend upon both the bills paid by that subscriber and on revenues received by the telephone company from other subscribers, in cases where those revenues are conditional upon the first subscriber remaining in the network. If subscriber A goes off the network, then subscribers B and C will be unable to contact him or her. There will be some degree of replacement here too: subscriber B may telephone C with a message to be passed to A (C's neighbour). Or A may telephone B from a pay phone rather than B telephone A at home. But the associated transactions costs may be quite high and replacement of incoming calls limited.

By this logic, revenues associated with incoming calls could (with an adjustment for replacement) be attributed to the callee in computing the cost of serving a subscriber under a universal service obligation. But there is obviously a risk of double counting the revenues, if a call from subscriber B to subscriber A scores both as a revenue for A and as revenue for B -- see Figure V.2. Indeed, transferring the revenue from B to A may diminish the cost of universal service obligation as it affects A but may tip B into deficit at the same time. In calculating the overall cost of the universal service obligation, care must be taken to prevent such double counting. This can be done, for instance, by employing an algorithm which attributes revenues associated with a call to
either the outgoing or incoming line in such a way as to minimise the cost of the universal service obligation.

c) Willingness to pay for access

Both the sections above have emphasised the network aspect of a telecommunication system. Telephone systems exhibit possibilities for substitution and complementarity in production as well as demand externalities. One example of the complementarity in production is the necessity for A to be connected to B if B is to incur the call charges associated with telephoning A. Another, and more familiar, demand externality relates to the dependence of subscribers' willingness to pay for access to the system upon the number of other subscribers connected to it.

This can be illustrated numerically in a simple matrix introduced by Brock (1986) (see Figure V.3). Element $V_{ij}$ of the matrix represents the expected direct value to $i$ of communication with $j$. Thus the first row of the matrix indicates that subscriber 1's valuations of the capacity to telephone subscribers 2, 3 and 4, are respectively 40, 30, and 10 -- making a total direct value of 80. Equally, the first column shows the value placed by subscribers 2, 3 and 4 on 1's participation in the network -- the indirect value. (There is, of course, no reason why the matrix should be symmetric.) The numerical example shows that the levels of "willingness to pay" of subscribers 1, 2, and 3 for participation in a 4-person network are 90, 45, 45 and 20 respectively. However, if the 4th subscriber were eliminated from the network, the willingness to pay of the survivors would fall to 70, 35 and 35 -- a total decline of 40. The extent to which the telephone company is able to convert this willingness to pay into actual revenues depends upon the pricing options which it has -- in particular its capacity to price discriminate. Nonetheless, it is clear that a subscriber's exclusion from the network may not only reduce revenues associated with incoming calls to that subscriber, but may also diminish the willingness of other subscribers to pay for access. To the extent that this willingness to pay can be converted into revenues, those incremental revenues should logically be attributed to the marginal subscriber.
Figure V.1. Call replacement

U = “unprofitable” customers
P = “profitable” customers
There will be different replacement rates for flows “a”, “b” and “c”.

Figure V.2. Treatment of incoming calls

Incoming

<table>
<thead>
<tr>
<th>U</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>I</td>
<td>IV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>U</th>
<th>Outgoing</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>P to P: assign to outgoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.</td>
<td>P to U: assign to incoming (provided caller remains profitable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.</td>
<td>U to U: assign to outgoing (but not to both caller and receiver)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV.</td>
<td>U to P: assign to outgoing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

U = “Unprofitable” customers
P = “Profitable” customers
This approach to valuing network externalities has two implications for the costing of universal service. It suggests that it is not invariably efficient to reflect cost differences in price, if doing so drives marginal subscribers from the network, and thus reduces the willingness to pay of infra-marginal subscribers. Secondly, it implies that low user schemes may be less costly than first appears. Bringing onto the network subscribers whose direct value is low may increase the willingness to pay of others and allow access charges to be raised. (In our example, keeping subscriber 4 on the network through a subsidy increases potential revenues from 1-3 from 3 x 35 to 3 x 45). Unfortunately, however, there is no obvious means of incorporating this effect in the estimates of the costs of universal service obligations.

4. The Australian study of the cost of universal service obligations

A number of possible ways of calculating the cost of universal service obligations have now been identified (see Figure V.4). On the cost side the principal alternatives are to use either fully distributed cost or avoidable (incremental) costs. As far as revenues are concerned, differences have been identified in the way in which replacement of calls is treated, in the allocation of revenue from incoming calls and in the dependence of subscribers' willingness to pay for access to the network on the number of subscribers attached to it. So far all the discussion has been at theoretical or conceptual level, with no account of the difficulties involved in realising the approaches or of disparities in the estimate of the cost of universal service obligations given by each of them.

Hitherto, comparatively little effort has been expended on the practical task of producing a costing or costings. Fortunately, however, a recent study has been carried out in Australia by the Bureau of Transport and Communications Economics of the Department and Transport and Communications (BTCE, 1989). For our purposes, this study has the great merit that apart from giving a thorough account of the issues involved, it implements both the fully distributed cost approach and the avoidable cost approach to the measurement problem.
Figure V.3. **Network externalities**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Total direct value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td></td>
<td>15</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>20</td>
<td>0</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

Total indirect value

45  65  50  40

Figure V.4. **Cost and revenue variants**

<table>
<thead>
<tr>
<th>Cost variants</th>
<th>Revenue variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Avoidable (incremental) costs</td>
<td>R1 Replacement included or excluded</td>
</tr>
<tr>
<td>C2 Fully distributed cost</td>
<td>R2 Calls assigned to outgoing line or (selectively) to incoming line -- to reduce cost of USOs</td>
</tr>
<tr>
<td></td>
<td>R3 Network externality neglected or incorporated</td>
</tr>
</tbody>
</table>

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Some insight into the reasons for adopting the two approaches is provided by the background to the report. The aim of the study was to provide data on costs and subsidies associated with meeting identifiable community service obligation in the context of developing Telecom Australia's corporate plan. (At the time, the phrase "community service obligations" was in use; it has now been replaced by the more familiar expression "universal service obligation".) It was suggested in particular that in setting the company's financial target, regard should be had, amongst other things, to the cost of meeting universal service obligation.

The implementation of two approaches can also be explained by two possible purposes of the study. Thus it was suggested that the avoidable cost approach was the appropriate one to use if the purpose were to determine what national resources were devoted to meeting community service obligations. If, on the other hand, the main aim of the study was to take account of the universal service obligations adequately in setting the company's financial target, it was argued by the company that the obligations should be assessed in a manner which allowed them to be derived from the realistic management information system and also enabled the operator (Telecom Australia) to manage them on a reasonable basis. The company believed that the best way to do this was by employing a fully distributed cost approach. For this reason, both approaches were adopted.

Implementation of the avoidable cost approach depended critically upon a breakdown of costs, each corresponding to different incremental or decremental units of output. This is illustrated in Figure V.5 (taken from the report). It shows that if the incremental unit of output is a call, then only the costs of electricity and the wear and tear on switches are avoidable, the other costs being joint or common. If, on the other hand, a customer were excluded from the network, then costs of the customer connection to the exchange would also be avoidable. As progressively larger units of output are removed from the system, the weighting of avoidable costs becomes larger and that of joint costs becomes smaller, until in the limit if all Telecom's output were excluded, all its costs would be avoidable.

For practical purposes, the levels examined in the avoidable cost study consisted of:

-- over 45 000 customer groups;
-- over 5 000 terminal exchanges;
-- about 250 minor switching centres;
-- 78 administrative districts.
Figure V.5. **Avoidable and joint costs at different analytical levels**

<table>
<thead>
<tr>
<th>Decision Level</th>
<th>Examples of cost items and categorisation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electricity wear &amp; tear of switches</td>
</tr>
<tr>
<td>Output</td>
<td>Avoidable</td>
</tr>
<tr>
<td>Customer</td>
<td>Avoidable</td>
</tr>
<tr>
<td>Exchange</td>
<td>Avoidable</td>
</tr>
<tr>
<td>District</td>
<td>Avoidable</td>
</tr>
<tr>
<td>Telephone network</td>
<td>All components of telephony costs are avoidable</td>
</tr>
<tr>
<td>Telecom</td>
<td>All Telecom costs are avoidable</td>
</tr>
</tbody>
</table>

*Source: BTCE, 1989, p. 26*

Conceptually, the procedure adopted involved first establishing whether individual customer groups were associated with shortfalls of revenue in comparison with avoidable costs. This produced an initial identification of all groups whose revenues fell short of avoidable costs on a group by group basis. Revenue was attributed to incoming or outgoing subscribers to minimise the cost of CSOs.

The focus then switched to analysis at the exchange level. Avoidable costs considered here included the sum of avoidable costs for all customer groups or the exchange, as well as other cost items that became avoidable at the exchange level. The purpose of this analysis was to determine whether there were any exchanges yielding a negative contribution overall, and if so whether that negative contribution exceeded the negative contribution for any combination of customer groups at the exchange. If it were larger, then it would be more profitable (or less loss-making) to exclude all the subscribers on the exchange than to exclude selected customer groups. The cost of the Universal Service Obligation (USO) would thus be the greater net loss of serving the exchange as a whole.
This calculation can be illustrated by an example. An exchange serves ten customer groups, seven of which make a negative contribution to the operator, to a total value of A$0.5 million. But the negative contribution made by the exchange as a whole is A$0.7 million: cutting off services to all subscribers would save the company A$0.7 million. The cost of the Universal Service Obligation (USO) is thus A$0.7 million.

The focus then switched to the minor switching level, where a similar analysis took place, and then finally to the district level. A large proportion of the company's administration and management costs occur at the district level, so that an additional large tranche of costs became avoidable there. If the negative contribution of the district as a whole were greater than the sum of the negative contributions of minor switching centres, exchanges or customer groups in the district, then that district level loss was counted as the cost of community service obligations over the relevant area.

The alternative fully distributed cost approach could in principle be computed on the same basis, substituting the fully distributed cost of service to customer groups, exchanges, etc. for the avoidable cost used in the alternative method. In practice, however, while the avoidable cost method involved collection of data to be processed according to procedures approved by the BTCE, the FDC approach was implemented by the company using its own database and adopting its own preferred procedures. These involved performing the analysis at one level only, that of the exchange. Costs were allocated on a fully distributed basis at this level, and then compared with allocated revenues. However, there was a further difference between the approaches on the revenue side. Revenue from incoming calls was not allocated to exchanges at risk of imposing costs of community service obligations. The effect of this, of course, is to reduce the estimate of the aggregate costs of community service obligations, as call charges are not allocated in a way calculated to minimise the number of loss making exchanges.

Appendix V.1 contains further details of the results of the study. Using the avoidable cost approach, and taking the opportunity cost of capital at 13.6 per cent, the researchers estimated that every district and minor switching centres when taken as a whole yielded a positive contribution to the company. Negative contributions were confined to the customer group and exchange level, and these were estimated in 1987-88 as amounting to A$230 million. An additional cost, estimated at A$10 million, was incurred by the company in respect of concessions to public institutions and disabled customers and to losses made by some public telephones. In addition the Departments of Social Security and Veterans Affairs of the Australian Commonwealth gave

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concessions to pensioners amounting to $47m in 1987-88. In consequence, the total cost of Community Service Obligations (CSOs) to the company was approximately A$240 million and the cost to the Government approximately A$290 million dollars. Appendix V.1 Table A2 shows the effects on the estimate of altering certain critical assumptions. Halving the cost of capital to 7 per cent nearly halved the cost of the community service obligation, while raising the estimated value of capital on the customer access network by 50 per cent raised it by approximately A$100 million.

In the light of the differences in methodology between the avoidable cost and FDC approaches, it is not surprising that the FDC approach implemented by the company yielded a much larger estimate of the cost of community service obligation. Using a cost of capital of 13.6 per cent, the estimated cost of community service obligations was A$800 million dollars. This fell to A$458 million dollars at a cost of capital of 7 per cent.

The procedure adopted also made it possible using either of the methodologies to establish the extent to which non loss-making lines provided by the company yielded surplus profits to be set against the cost of community service obligations. According to the avoidable cost approach, it was estimated that at a cost of capital of 13.6 per cent, the cost of community service obligations -- estimated at A$240 million -- was exactly compensated for by profits made on other customers. As a consequence, the company as a whole required no cost subsidy from outside. As a matter of logic, the same proposition applied using the fully distributed cost approach, where the estimated community service obligation cost of A$800 million dollars was exactly compensated for by excess profits made elsewhere in the business.

The Australian study is an unusually rich one because it illustrates the effects of implementing both the major cost allocation methodologies discussed in this paper. It also provides a useful numerical estimate of the relationship between the cost of community service obligations estimated by the avoidable cost approach and their cost estimated by the fully distributed cost approach (though the different treatment of revenue from incoming calls adopted in the two approaches is another cause of the difference in estimates). Other things being equal, the avoidable approach will inevitably produce a lower estimate than the fully distributed cost approach, but only the Australian study has given us an indication of orders of magnitudes involved in one particular application.
5. Conclusions on costing

Direct estimation of the costs of Universal Service Obligations (USOs) requires an allocation of the costs and revenues of the telephone network to individual subscribers or groups of subscribers. USOs impose net costs where allocated costs exceed allocated revenues.

The same range of procedures is available for allocating costs among subsidies as can be used to allocate costs among services. The two principal alternatives considered are the fully distributed cost (FDC) and avoidable cost approaches. In attributing revenues to particular subscribers, difficulties arise in estimating replacement effects (where an excluded subscriber may continue to make and receive calls on another line), treatment of incoming calls (revenues for which may in certain circumstances be attributed to the callee, rather than the caller) and network externalities (whereby the willingness of other subscribers to pay to access to the network is enhanced as a new subscriber is connected).

The appropriate method of allocation of costs and revenues depends upon the purpose of the exercise. If the aim is to calculate the incremental loss incurred by an operator which is required to serve all customers seeking connection at given (and uniform) prices -- and not just the profitable ones which it would serve anyway, then the avoidable cost approach is appropriate, with revenues attributed to incoming or outgoing calls to minimise the cost of universal service obligations. But other questions would require a different approach, and the choice of method may in practice emerge as a compromise between what is theoretically and conceptually appropriate and what is feasible, given that most cost allocation data available are based on the FDC method. Nonetheless, the Australian case study described above does demonstrate that both avoidable cost and FDC approaches can be implemented, and that they yield different results.

The allocation of universal service costs has a major potential impact on the development of competition. In the short run, the allocation of universal service costs to the incumbent may serve as a weapon for the management of competition and promotion of entry, but in the longer run competition among established operators is likely to imply some form of cost sharing.
### APPENDIX V.1. FURTHER INFORMATION ON THE AUSTRALIAN STUDY OF THE COST OF COMMUNITY SERVICE OBLIGATIONS (CSOS)

<table>
<thead>
<tr>
<th>Table A1. Sensitivity tests for the avoidable costs estimate of CSOs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline estimate (at 13.6% cost of capital)</strong></td>
</tr>
<tr>
<td>Baseline estimate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change resulting from alternative assumptions</th>
<th>$m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real opportunity cost of capital:</td>
<td></td>
</tr>
<tr>
<td>7.0 per cent</td>
<td>-118</td>
</tr>
<tr>
<td>10.0 per cent</td>
<td>-62</td>
</tr>
<tr>
<td>13.6 per cent</td>
<td>-0</td>
</tr>
<tr>
<td>15.0 per cent</td>
<td>+28</td>
</tr>
</tbody>
</table>

| Customer access network capital costs 50 per cent higher      | +108     |

| Allocation of junction costs equally to customers             | +13      |

| Alternative call charges                                      |          |
| Local calls:                                                  |          |
| +50 per cent                                                  | -40      |
| -50 per cent                                                  | +167     |

| STD calls:                                                    |          |
| +50 per cent                                                  | -62      |
| -50 per cent                                                  | +298     |

| Rentals:                                                      |          |
| +50 per cent                                                  | -28      |
| -50 per cent                                                  | +35      |

| Inclusion of district. State and national overhead costs at the customer group level analysis | +68     |

Table A2. **Sensitivity of FDC approach to CSO cost of capital**

<table>
<thead>
<tr>
<th>Cost of capital</th>
<th>CSO cost estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0 per cent</td>
<td>$458m</td>
</tr>
<tr>
<td>8.2 per cent</td>
<td>$508m</td>
</tr>
<tr>
<td>10.0 per cent</td>
<td>$594m</td>
</tr>
<tr>
<td>13.6 per cent</td>
<td>$800m</td>
</tr>
<tr>
<td>15.0 per cent</td>
<td>$899m</td>
</tr>
</tbody>
</table>


Table A3. **Cross subsidy from non-CSO to CSO customers**

<table>
<thead>
<tr>
<th>Opportunity cost of capital (per cent)</th>
<th>Item</th>
<th>7</th>
<th>10.01</th>
<th>13.6</th>
<th>15.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>7 170</td>
<td>7 170</td>
<td>7 170</td>
<td>7 170</td>
<td>7 170</td>
</tr>
<tr>
<td>Costs</td>
<td>4 030</td>
<td>4 030</td>
<td>4 030</td>
<td>4 030</td>
<td>4 030</td>
</tr>
<tr>
<td>Depreciation</td>
<td>1 185</td>
<td>1 185</td>
<td>1 185</td>
<td>1 185</td>
<td>1 185</td>
</tr>
<tr>
<td>Capital costs</td>
<td>1 005</td>
<td>1 435</td>
<td>1 955</td>
<td>2 250</td>
<td></td>
</tr>
<tr>
<td>&quot;Above-normal&quot; profit</td>
<td>950</td>
<td>530</td>
<td>0</td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>Telecom CSO cost</td>
<td>120</td>
<td>178</td>
<td>240</td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>Cross-subsidy from non-CSO customers to CSO customers</td>
<td>120</td>
<td>178</td>
<td>240</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Subsidy from non-CSO customers to the community (owners of Telecom)</td>
<td>950</td>
<td>530</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subsidy from the community (owners of Telecom) to CSO customers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>295</td>
<td></td>
</tr>
</tbody>
</table>

*Source: BTCE (1989), p.84.*
VI. CONCLUSIONS AND RECOMMENDATIONS

1. Introduction

The primary conclusion of this study is that, given appropriate support mechanisms, competition and the achievement of universal service objectives are not mutually exclusive nor necessarily in conflict.

In general, competition can bestow substantial benefits to telecommunication users in terms of overall price reductions, efficiency, improved quality of service, diversity, enhanced customer choice, increased overall investment, innovation, etc. Some of these benefits will assist in meeting universal service targets. For instance, lower long-distance prices could lead to lower bills for some rural and remote dwellers. Innovations in technology (such as those which have facilitated the use of satellite transmission or radio telephone networks) could lead to lower connection costs for some, including rural and remote dwellers. Quality of service too has improved.

Indeed, with appropriate targeted mechanisms in place, universal service can be achieved more effectively within a competitive environment and at lower cost than in a system of broad cross-subsidies.

Even in countries where competition is not intended, it is now being increasingly acknowledged that the complex, unfocused, inefficient and opaque cross-subsidy system that pervades pricing policies for many monopoly telecommunication networks must be reformed. What is required though is a greater recognition that the social objectives giving rise to this system can be preserved, and if desired, even expanded, without a sacrifice in equity and with substantial benefits in economic efficiency through a clearer specification of objectives and some judicious reforms in universal service delivery programmes. Rather than attempt to impede market liberalisation, the cause of universal service would be far better served by harnessing the concerns over competition to articulate and formally embed universal service targets and programmes addressed at potential barriers to universal service.
The report examined the impact of competition on several potential barriers to universal service, including:

-- telecommunication call prices;

-- connection charges;

-- rental charges;

-- deposit requirements;

-- quality of service;

-- disability in regard to telephone use; and

-- factors influencing voluntary non-subscription.

The essential conclusions reached by the report with regard to the impact of competition are that: the effect on call prices is somewhat mixed, because while long-distance call prices are falling dramatically, local call prices are showing signs of rising; quality of service has improved significantly, especially for large business customers, but there is need to ensure that this improvement applies to marginal and non-profitable areas too; it does appear, moreover, that assistance to the disabled has not abated under competition.

Nonetheless, there is distinct evidence that competition is accelerating price rebalancing, deaveraging and service unbundling. This is resulting in increasing rental and connection charges -- certainly in nominal terms -- which could impact adversely on the affordability of the telecommunication service particularly for some disadvantaged groups. However, competition is accelerating technological development and investment in new equipment so that these effects counterbalance price increases. Moreover, regulation and technological change have often meant that prices increases are in real terms often lower than CPI increase. "Affordability" should be related to the real relative price of telephone service. However, it is amply demonstrable from the regulatory measures which have been applied, and the variety of schemes already in place in the countries examined, that any adverse impacts on universal service which result from competition can be ameliorated through the use of appropriate schemes. Where current powers to introduce appropriate schemes are considered to be inadequate, regulators can be endowed with additional muscle through legislation, as the United Kingdom example of the Competition and Services (Utilities) Act 1992 demonstrates. The essential point
is that competition need not threaten universal service since adequate means to protect universal service are, or can be made, available.

Since competition bestows significant benefits upon customers and need not diminish prospects for universal service, the sensible approach then is to reap these benefits while ensuring through the use of regulatory measures and/or specific subsidy schemes that any problems competition does cause, especially for low income, elderly, rural and disabled groups, are addressed.

A system of specific subsidies targeted at barriers to universal service could in fact result in a much improved outcome for universal service than the one which has existed within monopoly situations. Such targeted support will also ensure that universal service objectives do not impede the competitive process.

Moreover, such direct and more transparent measures designed to lower barriers to universal service would also meet the criteria -- widely accepted in OECD economies -- that, where deemed necessary, assistance or special aid should be provided in a specifically-targeted and transparent way and provided directly rather than through ways that distort market and pricing structures.

2. Designing an operational universal service programme

a) Universal service objectives and coverage need to be clearly and specifically articulated

Debate about the "means" of achieving universal service should not distract from the recognition that it is necessary to be very clear about what the "ends" of universal service are. Loosely specified objectives can sometimes result in conflicting goals which can in turn result in the implementation of policies which are inconsistent with a government's intended policy directions for universal service. Moreover, poorly stated objectives can provide convenient excuse for unsatisfactory economic and commercial performance.

There is also the need to articulate objectives and specify the intended beneficiaries of universal service clearly. In this regard, it would help to break down the broad objective of universal service into a range of distinct, realisable and measurable targets for its sub-components, which may include:

-- universal geographic access;
-- universal affordable access;
-- universal service to the disabled;
-- universal quality of service; and
-- tariffs for universal service.

A point this report has made emphatically is that the definition of a "basic" universal telecommunication service is not a static one but (as observed in the case of the United States) tends to evolve over time. Therefore, a process should be established for reviewing, at regular intervals, the definition and coverage of universal service obligations. One suggestion which has been made is that universal service obligations and programmes for meeting these obligations be the subject of a major review every five years.¹

b) Identify barriers to universal service

Considerable community consultation and research, including surveys, is required to obtain detailed information about the barriers to universal telecommunication access and usage. Information about why some households are not connected to the telephone network is especially needed. Such information is necessary to guide the development of effective universal service policies.

c) Identify schemes which could cost-effectively address the identified barriers to universal service

Studying the successful practices of other countries could obviously be useful in this regard. But more imaginative schemes may also be required that would permit an examination of the reasons why people prefer not to have a telephone. Otherwise the significant number of people in this group could be destined to be part of the "information underclass".

d) Estimate the cost of universal service programmes

This issue was discussed in some detail in Chapter V. It is true that there are likely to be unavoidable elements of arbitrariness about cost estimates, but as demonstrated by the Australian example, an operational estimate can be arrived at. To minimise protracted argument, the approach to be adopted should
be clearly spelt out. In Australia's case, the costing methodology is actually outlined in the legislation.

There is little doubt that the appropriate concept upon which to base cost estimation is long run avoidable (marginal) cost. However, this cost establishes only the floor level for compensation payments to the universal service supplier (either by government, competitors or a universal service fund). Actual payments which recognise some joint and common costs would be quite consistent with economic principles and with business practice. Thus the actual payment made could be somewhere between the level prescribed by the Avoidable Cost approach and that indicated by the Fully Distributed Cost approach. There is a chance that methodological differences and debates could lead to protracted discussions with regulators.

The difficulties and uncertainties concerning cost estimation should not be allowed to delay the reform of universal service policies and programmes. Even if large in absolute financial terms, the amounts to be expended on universal service would only a relatively small proportion of total expenditure on telecommunication.

The costing process and outcome should be subject to audit; it should also be subject to regular disclosure.

e) Consider the relative merits of alternative mechanisms for funding universal service

In essence, the funds to support universal service schemes can come either from taxation revenue, levies on telecommunication users, or from the operator(s). Among other advantages, the first two options offer the advantages of transparency. Where the third option is preferred, the advantage of transparency is preserved if a universal service fund is established through contributions from all competing operators. Whatever the mechanism chose it is important to ensure that it is carefully structured and targeted so as to ensure that any subsidies do not lead to market distortions.
f) *Progress in universal service should be regularly and publicly reported*

All universal service providers should be required to present in their Annual Reports a separate account of universal service activities as distinct from commercial activities. Each Annual Report on universal service could include:

-- the separate identification of universal service requirements;

-- an outline of the operator's strategies and policies for carrying out its universal service charter, including a statement of targets and a time-frame for the achievement of these targets;

-- an estimate of the cost of the universal service programmes; and

-- the provision of statistical information on and a self assessment of performance in carrying out the universal service responsibilities.

At very least, a system of reporting would raise the public profile of universal service activities and thereby serve to increase the attention which the operator gives to its performance in the provision of these services. This would help ensure that universal service concerns are not reduced in priority due to competitive pressures.

To maintain the benefits of a competitive (or contestable) market in the supply of universal service, the option for the current universal service provider to be replaced by a more cost-effective supplier should be preserved. For example, the contract to provide universal service can be achieved in two fundamental ways:

-- The method to replace the current universal service provider that has the greatest transparency is one wherein the targeted support recipient is permitted to directly choose which service supplier he would like to serve him. For example, this transparent approach might be achieved by giving the targeted support recipient a "universal service coupon" redeemable only for the purchase of certain telecommunication services.

-- The second method of replacing the current universal service provider can be based on an open tender bid to be awarded to the firm requiring the lowest payment for the provision of a stipulated quantity and quality of universal service. In addition, a fair
method of compensation for the outgoing universal provider for transferred or abandoned plant should be established.

g) **Performance in universal service delivery should be regularly monitored and evaluated**

Arrangements should be established to ensure that the delivery of universal service requirements is independently monitored and assessed.

One aspect of the performance evaluation is to compare achievements against the preset universal service targets. The performance indicators selected should be relevant to both monitoring and improving performances. That is, the aspects of performance they focus on should be relevant to, and able to be successfully influenced by, the telecommunication operator's management (Xavier, 1991).

In Australia, AUSTEL, the telecommunication industry regulator, has been given the responsibility for monitoring and evaluating performance in universal service delivery. In the United Kingdom, the Competition and Services (Utilities) Act 1992, has given OFTEL strengthened powers to perform such a monitoring function, particularly in regard to some aspects of performance such as quality of service.

The role of consumer groups -- including those representing residential subscribers -- should not be overlooked, of course. Consumer organisations have strong incentives to monitor the performance of operators, including the delivery of universal service. They should be actively encouraged to do so. After all, they purport to represent the views of those whom universal service objectives are meant to assist.
NOTES

Chapter I

(1) From the viewpoint of a particular country, another benefit of introducing competition in the telecommunication market is worth noting. A country which introduces competition ahead of others will allow its telecommunication operator(s) to develop its competitive skills, muscle and experience, thus enabling it to compete more effectively in increasingly global telecommunication markets. Thus, the attempt to protect an incumbent operator from competition could, in the longer run, be doing it a disservice since this gives telecommunication operators in liberalised markets more time to develop the competitive skills and experience that they may well face in the future.

Chapter III

(1) See, for example, data in AT&T (1992), *The World's Telephones*.

(2) There are a number of difficulties with BT's argument concerning the need to rebalance charges in order to reduce cross-subsidy and adjust prices to more closely reflect costs which need to be at least noted here. As discussed in Chapter V, the Fully Distributed Cost (FDC) accounting procedure on which BT bases its claim that there is a cross-subsidy between usage and access has been viewed with some scepticism by the United Kingdom Department of Trade and Industry [Duopoly Review Consultative Paper (DTI, 1990)]. In addition, there is the question of interdependence between the cost of supplying access and that of supplying calls since a call cannot be made without an exchange line. Moreover, it is equally difficult to identify a separate demand for calls and exchange lines since demand for access normally implies an intention to make calls and always a preparedness to receive them. For these reasons, attempts to quantify any cross-subsidy
between calls and exchange lines are unlikely to yield any meaningful answers.

Chapter IV

(1) The competitive situation in the United Kingdom allows new companies to set up their own payphone network. One company expected to do so is Telecom which promises to install payphones in sites that BT and Mercury have not sought to reach. Moreover, Telecom is planning to install only coinboxes because it considers many people seem to prefer them. This could certainly be true for low income users. While card based systems might be more convenient for the operator, it may not suit users. An example to be followed is being shown by Telefónica, the Spanish operator, which is engaged in installing payphones which allow payment in three ways: coin, pre-paid card and credit card.

(2) The United Kingdom Advisory Committee on Telecommunications for Disabled and Elderly People (DIEL), believes that BT and other telecom companies should be required to fund the development of special telephone services to enable deaf and other disabled people to gain equal access to the telephone network. At present, profoundly deaf and certain other disabled persons can gain access to the network by using text telephones linked to a national relay service operated by the Royal National Institute for Deaf People (RNIB), but this service is dependent on charitable funding from BT.

DIEL has argued that the licenses for BT, Mercury and other public telecom operators should be changed to require them to make funds available to guarantee the future of the RNIB service and to help reduce the additional costs which disabled people are forced to incur when making calls by text telephone. The committee recommends that BT should be required to convert all remaining hard-wired residential telephone installations to the modern plug and socket arrangement free of charge within five years. DIEL claims that many of the customers concerned are elderly or disabled people who cannot afford the cost and are denied a handset of their choice as well as other benefits. It supports BT's commitment to extending low use rental rebates and suggests that new customers should be able to spread the cost of the connection charge over two years (European Telecommunications, 1 May 1992).
Chapter V

(1) As the Director-General of OFTEL (DTI, 1991, p.62) put it:

"Marginal cost normally sets some kind of minimum on the prices that should be paid because, if prices do not cover marginal cost, resources may be used in ways that produce less value than is sacrificed through their use. However, if each customer is charged exactly marginal cost, total revenues will fall short of total costs. Hence, actual prices must be increased above marginal costs. The best way to make this increase -- the argument proceeds -- is to mark up marginal cost most heavily where it is least likely to discourage customers from using the service on a market-wide basis. If this is done, the services provided are likely to be those which give the highest economic value" (p.62).

Chapter VI

(1) John Hughes of the United Kingdom National Consumer Council made this suggestion to the author.
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