INTERNATIONAL TELECOMMUNICATION UNION

STUDY ON THE APPLICATION OF COST MODELS IN LATIN AMERICAN AND CARIBBEAN COUNTRIES

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NOTES – The opinions expressed in this document are those of the author and do not necessarily reflect those of ITU or its membership.
The terms and definitions used are those of the author and in no way replace the official ITU definitions.

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[1] Based on the responses to the questionnaire that was circulated to administrations and on information from "other sources".

CHAPTER I

Background
Cost-oriented prices and cost models

1.1 Origin and purpose of telecommunication price regulation

No study of pricing and cost regulations can be presented without a brief reference to the evolution of the telecommunication sector in recent years, most of the Latin American and Caribbean countries (LAC) having switched, by the end of the 1990s, from a basic telephone service monopoly to the competitive provision of numerous services and convergence of networks and services, including the availability of user mobility.

In the early days, the telecommunication sector – in LAC like everywhere else – was characterized by a monopolistic structure. Fixed telephony was a natural monopoly. Production entailed input-related cost increases that were invariably lower than the increases in revenues, thus leaving it without an optimum theoretical level in terms of price and quantity of service. This made it necessary for the State to intervene in the tariff-setting process, while at the same time involving the sector in the pursuit of various social policy objectives.

The creation of autonomous entities to regulate service providers in terms of tariff-setting began only in the 1980s, and in many cases the 1990s. To a large extent, this time lag can be attributed to the fact that the operators were State-owned.

In a monopoly scenario, as well as regulating tariff aspects, the regulatory body can perform other functions in relation to the service, such as, for instance, regulation of investment plans and quality of service.

Within this context of the State or semi-State administration of telecommunication enterprises, pricing decisions may thus end up being based on a range of considerations, including a significant transfer of earnings from international and long-distance telephony services to local services (which have a greater impact on the user's family budget), and, in many cases, tariffs that are not in line with costs, whether for each type of service or for the business as a whole.

Where tariffs were thus too low to cover costs, the consequence in many cases was to postpone investment, resulting in low penetration levels, lower quality of service, etc. At the same time, unlike many other public services, the telephony sector rarely benefited from State resources to finance the deficit, on account of the priority given to other basic services (water, power), hence depriving it of alternative sources of funding.

In response to this situation, and bearing in mind the obvious link between telecommunications and economic and social development, countries began to look more realistically at their tariff structures, which generally bore little relationship to costs, and to consider the possibility of allowing more private-sector participation in service provision.

Furthermore, the 1980s saw the first move to open up the telecommunication sector to competition when the United States, followed by Europe, liberalized its long-distance services, thereby initiating a paradigm shift which made it necessary to bring prices into line with costs.

In the 1990s, privatization was the watchword throughout LAC, although Chile had already begun earlier to move in that direction. In the meantime, technological development was presenting the conventional services with new areas of competition, both actual and potential, with the continuing spread of cable television and, more significantly, the emergence of mobile telephony.

The evolution of new services heightened the need to bring the regulated prices of the monopolies into line with costs. At the same time, the need to ensure general well-being and the development of services gave rise to new requirements on the regulatory front.

With monopolistic service provision, meeting the **universal service obligation** (USO) is implicitly or explicitly entrusted to the incumbent operator, either because its scope and cost coverage derive from the general obligations in respect of provision of the telephone service (plus other possible factors), or because USO constitutes a specific item in the provider's general obligations. With the opening up of the telecommunication sector to competition, the regulator must clearly specify the scope, obligations and costs involved in any universal service deficit.

In parallel, the regulation of interconnection between networks is taking place, with new services connected to the network, from different networks to those already in existence (mobile telephony), as well as the possible provision of similar, competing services by new providers.

Hence the growing need for telecommunication price regulation, across the whole range from tariff-setting for basic services in a monopolistic market to the new requirements stemming from the introduction of competition, where price regulations are maintained for as long as there is still a situation of significant presence (market dominance or power); plus, at least, calculation of any deficit in regard to the universal service obligation and the determination of interconnection prices. In the event, moreover, that the regulatory framework includes an unbundling obligation in regard to the incumbent operator's essential facilities, there is also the need to regulate the price of leasing such facilities.

Under the terms of the General Agreement on Trade in Services of the World Trade Organization (WTO), to which most of the countries of the region have subscribed and which may be taken as a guide to the generally accepted basic principles, the presence of a regulator is necessary in order both to ensure competition and to manage scarce resources. The latter function will still be applicable even where there is no competition in service provision.

There are at least three scarce resources in the telecommunication sphere, namely the radio-frequency spectrum, rights of way and numbering. Administrations grant numbering facilities free of charge, while maintaining their administrative rights and, in some cases, their ownership of the resource in question, whereas use of the spectrum resource and rights of way are typically granted on a paying basis, although some examples of their being granted free of charge may be found.

In a liberalized environment, the regulator's new obligation is to ensure that that environment works, to which end interconnection rules are established and, as the case may be, interconnection is made obligatory. This may in turn be subject to regulation *a priori* or be made a matter for agreement between the parties (the more customary arrangement) under conditions of non-discrimination (equal treatment for the different interconnecting networks) and with the possibility of appeal to, and/or arbitration by, the authority.

As already indicated, one of the key regulatory aspects in such cases is price-setting or, at least, the orientation of interconnection prices. Where there is an obligation upon the dominant operator or – as is most commonly the case – operator(s) with market power, or any others that may be specified, to unbundle ***essential facilities*** [2] so as to make them available for use by other operators, there may also be a need to set or orient prices.

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[2] ***Essential facilities*** are those network elements that can be unbundled and which, for technical or economic reasons, are not replicable by another (new) operator that needs them in order to provide its services.

The general principle established by WTO – and accepted in all telecommunication literature and by the International Telecommunication Union (ITU) – in regard to the setting of such prices is that they must be aligned on costs, or "cost-oriented". This principle is known as "cost causality".

According to Calzada and Trillas (see the bibliography) "*in a liberalized telecommunication market, the regulatory policy tends to be* [read "must be"] *geared towards ensuring that prices are aligned on costs (assignative efficiency), encouraging companies to minimize their costs (productive efficiency), monitoring the universal provision of basic services* [add here "and any others that may be specified"]*, eliminating entry barriers, increasing the range of services on offer, ensuring that cost containment does not have a negative impact on quality of service, and ensuring equal opportunities for all operators*".

As regards the equal opportunities objective, and within the context of safeguarding competition (having regard to the degree to which liberalization has evolved and the difficulties encountered), the competition oversight function tends to be entrusted to the State authority. However, this regulatory function does not exist in many countries of the region, while in others it is entrusted not to the authority responsible for the telecommunication sector but to a specific entity responsible for competition in general, i.e. in all sectors of the economy. This issue is, however, outside the scope of this study.

1.2 Main concepts in the area of telecommunication costs

According to pure economic theory, the optimum price is that which equals the marginal cost of the unit most recently produced. However, this criterion does not work in practice for a natural monopoly (with diminishing marginal costs), inasmuch as the price would need to be revised constantly for each additional unit, with large discrepancies depending on whether or not the networks have spare capacity (marginal cost tending towards zero). Furthermore, and no less importantly, the fixed costs would never be recovered because the marginal costs and the prices thus determined would lie below the average costs.

In view of this limitation, economic analysts developed the concept of "long-run incremental cost", which takes account of the total cost incurred in the provision of a discrete additional amount (increment) of a given service and which is applied in the context of communications as well as of other public services with diminishing costs.

These developments imply acceptance of the principle of cost causality, i.e. that the price must reflect the cost incurred in producing the service and no other costs.

At the same time, analysing the production process in the telecommunication industry, as in other industries that produce a combination of products, we are able to distinguish "***economies of scale***", stemming from lower long-run costs at higher levels of production, from "***economies of scope***", whereby, with combined production of several products, the costs for each individual service are lower than would be the case if each of the services were to be produced separately.

In this way, the combined production of a range of services with diminishing costs can encompass both economies of scale and economies of scope, and this is usually the case in large, well-established telecommunication companies (i.e. the first to enter the market, generally as a monopoly supplier).

One of the issues that arises in the study of the cost of services in the context of combined production operations is their proper allocation, it being necessary to respect the principle of "***cost causality***", whereby each cost is allocated directly or indirectly to the service giving rise to it, to which end, as we shall see, appropriate allocation techniques have to be applied.

In addressing these issues, one needs to review the main concepts in regard to telecommunication costs, beginning with a look at two contrasting approaches: historical cost accounting versus theoretical or engineering approaches that seek to incorporate management efficiency.

1.2.1 Historical costs

This refers to the costs actually recorded and accounted for in the incumbent operator's books, without any additions, such that they reflect the costs actually incurred.

The main advocates of this approach as the basis for determining the price (or basket of prices) have for the most part been the incumbent operators themselves, since in this way they are able to ensure they recoup all of their past expenditure, which in some cases may have been associated with technologies that are now outdated or have become more costly than new technologies now available, or which were based on demand forecasts that proved to be out of line with subsequent events, etc.

It is worth pointing out that some theoretical cost engineering models which, by definition, do not accept the historical past, have nevertheless to adopt at least the nodes already in existence for the siting of exchanges (scorched node), thereby acknowledging at least one of the restrictions that the passage of time imposes on the incumbent operator.

Another argument in favour of using historical costs is that they are more easily accessible, although this assertion has to be tempered to take account of the problem of information asymmetry between regulator and operator, whereby the latter may not always furnish such information in the manner most suited to the regulator's needs.

The strongest criticism in regard to the use of historical costs for pricing of services is that they fail to encourage efficiency because they accept the use of obsolete technologies and the possibility of poor administration, high capital costs, hidden utility costs, etc., thereby going against the interests at stake and hence the overall well-being by giving rise to higher costs and, consequently, higher tariffs and interconnection charges which dampen consumption and competition, respectively.

We will return to the historical cost methodology at a later stage when considering the fully distributed costs (FDC) approach.

1.2.2 Forward-looking costs

This has to do with estimating the cost of services by means of an engineering method based on the best process using the most up-to-date technology, i.e. as if the company were starting up production as from the point in time at which the study was conducted, without reference to any previous operations, older technologies, etc. In all cases, the aim is to adopt the very latest and lowest-cost technology.

This approach seeks to encourage management efficiency inasmuch as the costs that are used for the purpose of price-setting do not take account of the higher costs resulting from technology or management inefficiencies.

Although forward-looking costs eliminate the effect of any measure of inefficiency in the operator's historical activities, the operator has to assume the existing network nodes (scorched-node approach). At the same time, the latest eligible technology would be that which has already been tried and tested and is available on the market, and not necessarily the most advanced. It is also generally recommended that the ideal network design should incorporate an equivalent degree of initial idle capacity in order to be comparable with the situation of the incumbent.

The use of forward-looking costs is associated with the LRIC method. The main criticism levelled against forward-looking costs has to do with the intrinsic difficulty of designing an engineering model that describes a company that is both ideal and nonexistent.

Forward-looking costs do, however, serve to minimize the problem of "information asymmetry", since the regulator has a theoretical model on which to base its actions, without always having to rely on the operator's willingness (or otherwise) to furnish the necessary data and information. However, not all of the information can be obtained without reference to the operator: traffic data, as well as other sensitive information essential to the design of an ideal network, are critical factors to which the regulator can have access only by consulting the incumbent operator's records.

1.2.3 Current costs

Historical costs can reflect past behaviours that have ceased to be efficient on account of market changes as a result of which new alternatives that were initially rejected have now become economical (new technologies adopted and in use and/or changes in the corresponding prices). They also reflect management errors on the part of an operator whose administration of the available resources has not been fully efficient.

At the other end of the scale, forward-looking costs can paint a picture that is very difficult for an efficient operator to turn into reality, even when it strives to keep up with the market changes almost as they occur.

For these reasons, those working with cost models[3] tend to use, as a means of correcting historical costs, the concept of "current costs", which may be defined as a method for updating historical costs based on the efficient use of resources (efficient management), implying use of the most up-to-date available technology in economic terms, such that the cost does not reflect any inefficiencies on the part of the operator. Unlike the costs that are reflected in the accounting records, which represent past actions, current costs correct any drift that may have occurred in relation to the market values current at the time of the study.

Although the current costs concept tends towards a forward-looking methodology, it seeks to overcome the practical difficulties associated therewith.

When calculating current values on the basis of historical records, the greatest challenge lies in the valuation of assets, in respect of which there are various approaches. Asset valuation based on the net replacement cost would imply the assumption that the asset will be replaced by a new one of a similar nature, although this, given market – including technological – changes, will not always be the case.

One alternative is to consider the gross replacement cost, which implies replacement of the potential service capacity of the asset in question with another based on a different technology or having a different economic cost, although with this method we will be assuming that the network is replaced from scratch, as if all of the assets taken into account were at the beginning of their useful life.

By contrast, use of the net replacement cost implies acceptance of the fact that the assets in question have reached different stages in their useful lifetime. In this case, one takes whichever is the lower of the current net cost of replacing the asset and the amount of its recoverable value (which may be either the product in economic terms of its remaining useful life as an asset, or its sale value). Calculation of the net replacement cost is similar to that of the historical depreciation, but taking as a basis not the historical purchase value (adjusted for inflation) but rather the current value of a new asset on the market.

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[3] See the section entitled "Cost modelling".

Another alternative is to use the economic value, calculated as the net present value of the net revenue flow that will be generated by the asset in the future. Finally, on the theoretical side, we may use the modern equivalent asset valuation approach, which means not only determining the suitable technological replacement of the asset recorded on the books, but also its presentation in the new accounts at the same levels of functionality and capacity as the asset that has been replaced. This adjustment must precede those that will have to be made in the area of maintenance and other costs relating to the asset in question.

1.2.4 Fully distributed costs

This system, which is associated with the use of companies' historical costs, allocates the costs in full to the services provided, establishing criteria for the distribution of both direct and indirect costs and of non-allocatable common costs.

Although the aim is to establish a driver for each type of indirect cost to enable its allocation or distribution among the different types of service, it is not always possible to avoid approaches that involve a certain degree of arbitrariness.

The generic approaches used in practice consist in: (1) cost distribution according to the relative share of each service in terms of output (production share method), if this corresponds to a shared quantitative measurement in physical terms; (2) distribution according to the share of each service in terms of revenue (gross revenue method), the costs being distributed in the same proportion as that in which the services contribute to the generation of gross revenue; (3) distribution according to net revenue (net revenue method), which is the same as the previous approach but based on contribution to net revenue; (4) distribution according to the share of the services in line with directly allocatable costs (allocated cost method).

Of course, the main criticism of this system has to do with the arbitrary nature of the cost distribution, which may lead to the setting of service prices that mirror that arbitrariness. There is also the pitfall of circularity, in that non-allocatable costs are assigned on the basis of the percentage costs or revenues of each service vis-à-vis the rest – a percentage in whose determination those same costs or cost-aligned prices were used.

To this technical criticism of the allocation model we may add another, related to the enterprise's welfare, since the use of FDC does not encourage efficiency, although it would technically be possible to design an ideal company with forward-looking costs or, more probably, current costs, for the calculation of FDC.

1.2.5 Activity-based costing (ABC)

The ABC approach is an administrative accounting tool for establishing objective causal relationships between costs and services. It views the services in question as a set of activities, each of which consumes resources and hence generates costs. The ABC methodology uses drivers to establish the causal links between costs and activities, thereby strengthening the ultimate linkage between costs and the services which constitute the end output of the production process.

In principle, costs are allocated to services directly where the relationship is unambiguous, and indirectly where the relationship is less easy to determine (the generic case of common and shared costs). Joint or shared costs are those which are incurred in the production of more than one service at the same time, while common costs are those which have to do with the general administration of the company and cannot be assigned to the production of one or more services in particular.

1.2.6 Long-run incremental costs (LRIC)

In the case of a firm providing different products or services, the incremental cost is the change resulting from an increase in the supply of a given product or service, including all of the direct and indirect costs that can be attributed to that change or increment, which means that the indivisibilities inherent in that increase must also be taken into consideration. The incremental cost includes a reasonable rate of return on the capital invested and is calculated over the long term, i.e. over a discrete period of time.

From the economic standpoint, any increase in production is in itself an increment; hence, the incremental cost implies a definition in regard to the size of the increment associated with the increase in cost. Mathematically speaking, the incremental cost may be defined as the difference between the total cost associated with the overall production of the service including the increment in question minus the total cost associated with the overall production without that increment.

The LRIC can therefore be defined in two ways that are complementary. On the one hand, it is the additional cost that a firm incurs over the long term in providing a particular service on the assumption that all of its other production activities remain unchanged. On the other hand, it is the total cost that the firm would avoid over the long term if it were to cease providing that particular service (***"avoidable cost"***).

A more all-embracing approach is to consider the entire production of the service as an incremental cost, thereby including all of the costs incurred apart from the costs that are common to all of the services produced, assuming them to be in production. This gives us the so-called "total service long-run incremental cost" (TSLRIC).

If we divide the TSLRIC by the total number of units produced, we obtain the average incremental cost (AIC) or incremental cost per unit.

In short, the TSLRIC is the total amount of the costs (including a return on investment) incurred by a company in producing a given service, assuming that all of its other services are in production. It can apply either to a single service or a group of services. As has already been stated, the costs in question are to be considered as "forward-looking" and as being based on the latest technology available on the market at the best available price.

The following would be a more precise definition: TSLRIC is the difference between the overall cost of producing all of the services in the range of services the company offers less the overall cost of producing the full range minus the service in question. The TSLRIC for an individual service is obtained, as we have seen, by dividing the TSLRIC by the total demand for that service.

The European Union accepts the use of the TSLRIC, since it recognizes the inclusion of those fixed costs that are specific to the service as distinct from those costs that are common to the different services produced.

The prices of a company which shares resources among various services will under no circumstances be set as low as the LRIC, since each and every one of those services must make some contribution to the shared costs or common costs. There is, however, no *a priori* criterion for determining how much of the common costs are to be covered by each service in particular, other than the fact that they must fulfil three conditions: each service must cover some part of those costs, no one service must cover all of the costs, and there is no requirement for the different services to contribute in equal measure, although this is what normally tends to be the case.

Indeed, the generally accepted way of assigning common costs is by means of the "***equal proportional markup***" (EPMU) approach, whereby the common costs are recovered in proportion to the incremental cost assigned to the different services produced. This method is used because it is easy to implement, although it can be somewhat arbitrary and is not necessarily the optimum approach when it comes to competitive incentives.

1.3 Cost modelling

Cost modelling, i.e. the use of cost models, is a means of broadening the scope of regulatory policy so as to determine the most appropriate costs according to the principle of cost causality, as referred to earlier, for a given network. The aim is to establish a specific and systematic methodology with a set of basic allocation and calculation criteria and procedures for the determination of costs, also making use of up-to-date standard technical values (coefficients) for determining the theoretical costs of an efficient operator in a given market (country, local area, etc.).

Cost models can thus be used within a range of possibilities, from a "methodology guide" type model, with specific steps for determining costs, to a "black box" type model requiring nothing more than the input of a number of basic data elements (traffic, connection points, etc.) for the network in question in order to establish a theoretical optimum engineering cost.

Generally speaking, cost models are of the "scorched node" type, accepting certain constraints on the existing network and allowing for the incorporation of each country's market realities, i.e. the price of assets, current labour costs, cost of capital, etc., in addition to the physical network traffic data. However, such models have an engineering basis inasmuch as they construct the network around optimum design criteria.

Cost models use the *bottom-up* and *top-down* approaches. In the case of the bottom-up model, an ideal or fictitious network is designed using traffic estimates based on statistical data, thereafter distributing the values of the assets used among the different services that call for them, whereas in the top-down model the existing network is the data source.

Generally speaking, where the existing network is taken as the data source (top-down model), a correction factor of the current cost type is applied to the data values as a step towards the possible incorporation of forward-looking costs and appropriate cost shares associated with production volumes.

The bottom-up approach is generally described as an engineering model, which starts with the demand for the service, uses specific algorithms to construct an efficient network capable of satisfying that demand, and then enables computation of the most efficient cost.

A widely accepted *hybrid* approach involves the use of both types of model as complementary tools, with the top-down model serving to determine the efficient cost of the existing network, while the bottom-up model is used to check its efficiency.

An important distinction in regard to the TSLRIC relates to the accounting allocation criteria in the ideal or standard model for the costs of assets shared by different services, whether the distribution is made from the value of the asset to the various services (bottom-up approach) or whether a determination is first made of which assets are involved in the production of the service in order to determine the corresponding cost (top-down approach).

In order to obtain a cost model, the regulator must select a set of variables, from the levels of inefficiency it is able to accept to a reasonable rate of return on capital and the proportions and types of common costs that can be recovered in each type of operation.

The correct valuation of the cost of capital requires suitable valuation both of the ***weighted average cost*** of the operator's debt and of the cost of equity (the return that the shareholders, i.e. the owners of the equity, expect in consideration for their decision to invest in the network), as well as the base values of the debt and of the equity.

In order to assess the weighted average cost of capital (WACC) in the debt market it is necessary to average out the sum of the cost of the debt and of the equity, weighted according to their respective shares, taking into consideration the impact of taxes and the rate of market risk as well as the Beta factor for the volatility of shares in the telecommunication sector with respect to the market average.

1.4 Other concepts relating to the study of costs

1.4.1 Interconnection

The International Telecommunication Union (ITU) defines interconnection as "the commercial and technical arrangements under which service providers connect their equipment, networks and services to enable customers to have access to the customers, services and networks of other service providers".

For the signatories of the agreement on services, WTO provides that interconnection with the networks of the dominant operator shall be guaranteed. A distinction can be made between direct interconnection, where the two networks involved are physically connected to one another through one or more points of interconnection (POI), and indirect interconnection, where users of one network can call those on another through a third-party network.

A further condition established by WTO for the signatories, and which could be taken as a universal criterion, is that an interconnection charge must relate solely to the network elements that are actually used.

A distinction must likewise be drawn, although this does not currently have a great impact on regulatory practices, between "one-way" interconnection (where the users of one network alone have access to the other) and "two-way" interconnection (where the users of both networks can access those on the other).

1.4.2 Access deficit

This refers to the portion of the fixed cost of deploying a network that is not covered by the subscribers and that is paid for by the users of the incumbent operator's network. Additionally, a part of the revenue provided by other operators joining the network and paying for interconnection may go towards covering the access deficit, although this will depend on the price levels that are agreed upon or, as the case may be, are set by the regulator.

The general economic consensus is that, where tariffs are concerned, the access and connection prices applicable to the incumbent operator's subscribers should cover the cost of access such as to make the usage price for interconnection independent of the access deficit.

1.4.3 Total element long-run incremental cost (TELRIC)

Networks are made up of different functions or identifiable elements. The TELRIC method enables calculation of the incremental cost, as defined above, for each element so that one ends up with not only the total cost but also the total cost of each of the elements identified. This in turn, where applicable, allows for the determination of costs and setting of cost-oriented prices for each type of network element, so as to regulate the price for the sale of those facilities to third parties.

The TELRIC was introduced by the United States regulatory body, FCC, in order to take account of a part of the common or joint costs, which FCC itself conceptually describes as recognition of a reasonable assignment of joint costs and common costs pertaining to services.

1.4.4 Standalone cost

The standalone cost (SAC) is the cost that an efficient company will incur in producing a service or group of services on their own, without taking into account any other services it produces. These costs are also forward-looking and long-run and are based on best use of the best available technology that can be implemented.

Standalone costs thus differ from embedded costs, which are the costs incurred by the company and recorded on its books; they do not take account of the revenue requirements of the established company. Generally speaking, embedded costs or costs incurred by the company imply inefficiencies, the use of technologies that are not always the most advanced, high capital costs, etc. By contrast, standalone costs are minimal costs that the company would incur in entering the market for the first time from zero in order to provide a single service, although in such a case it will be unable to benefit from the economies of scope that come with combined production of a range of products.

1.4.5 Unbundling

The unbundling of essential facilities consists in **requiring the dominant operator to sell essential network facilities so as to facilitate competition** in regard to infrastructure for new entrants. This obligation is not present in all regulatory frameworks, but represents a growing trend within the context of telecommunication liberalization processes.

Under the guidelines approved by CITEL (the region's international body for telecommunications), the appropriate conditions for the regulation of unbundling are:

1) minimum list of feasible interconnection points belonging to the main operator;
2) interconnection offer at any point beyond those identified as feasible, subject to recovery of any additional costs to which this gives rise;
3) requirement to provide unbundled facilities for resale in such a way that the prices quoted can be compared with those paid by subscribers;
4) non-discriminatory access to rights of way;
5) protection of competitors' commercial information obtained by the main operator for the purpose of agreements for the sale of facilities, including interconnection.

1.5 The TAL model for Latin American and Caribbean countries

The TAL model was developed at the regional level for the purpose of calculating international accounting rates for Latin American and Caribbean countries, its purpose therefore being strictly similar to the determination of international interconnection rates. The model (in fact, the recommendations to which it gives rise) could, however, be extended to the economic calculation of tariffs for other fixed services (e.g. local telephony).

Strictly speaking, the model is a set of procedures for determining the costs of a given service (in this case the international interconnection service), making it more of a regulatory scheme than a model. These general principles were approved with the adoption of ITU-T Recommendation D.400R in 1999.

Member States are required to keep detailed accounts of telecommunication cost prices, and the TAL method helps in determining the price of international services.

The TAL model was originally designed to work on the basis of the costs actually incurred rather than the expected costs, and it is therefore those values that are to be found in the audited accounting records of telephony operators.

From this baseline, it was acknowledged that the production processes of the region's operators might be less than optimal and open to future efficiency gains, (less-than-full capacity operation in international switching facilities).

To that end, it was established that the cost per minute C would be determined by the total cost of the service divided by the minutes of traffic, but subtracting therefrom an efficiency gain (Eg) over time. The termination rate T is then determined by adding in the cost per minute of the universal service obligation (USO).

The recognized cost components with the corresponding allocation to the service whose cost is being calculated are:

- allocated investment cost;
- allocated capital amortization/depreciation cost;
- operational and maintenance costs;
- allocated research and development costs;
- allocated administrative costs;
- allocated tax cost.

The network elements recognized by ITU-T Recommendation D.140 are:

- international transmission;
- international switching;
- national extension (access network and transport network).

The Recommendation acknowledges the need to recover direct and indirect costs and administrative overheads, plus a reasonable return on investment. The capital investments include switches, transmission equipment, land and buildings, furniture, motor vehicles, cables and conduit, etc. The direct costs can be determined more simply from the accounting ledgers. For the allocation of common and joint fixed costs, recourse may be had, as the case may be, to traffic data, the proportion of capacity usage of common facilities, and the share of direct expenses incurred used as a proxy. The operational costs will include capital costs (depreciation, rate of return, taxes on profit and property taxes) and operating expenses (maintenance, network administration, traffic, marketing, billing). Possible guidelines are likewise established for the attribution of indirect costs, which must, as a general rule, conform to a "suitable mechanism".

The "Revised TAL Interconnect Cost Model" is also intended for administrations (regulatory bodies) to serve in the determination of international call termination charges on the telephone network (termination of voice traffic on fixed networks). It is assumed that the physical interconnection points in the countries of the TAL region are for the most part confined to the transport network, which comprises the switching network (including signalling) and the transmission network.

Using the original TAL model formula, the cost C is taken to be the total per-minute cost less an efficiency gain factor, the aim being to achieve long-run economic-efficiency costing (LEC) for total traffic, although for new traffic it is more appropriate to think in terms of incremental economic-efficiency costing (IEC).

In both cases, account has to be taken of specific efficiency constraint factors such as diseconomies of scale, high financial costs within the region, geographical impediments and procurement disadvantages. In addition, the cost model must include an analysis of efficiency in network configuration. On the other hand, however, when switching to an incremental cost model for calculating additional traffic, a number of common customer-facing expenses will cease to be identified in the termination service, such as those relating to advertising, marketing, subscriber billing, etc., it being understood that such costs are geared towards maintaining other network services.

As with a long-run efficiency model, the revised model uses ex-ante efficiency criteria to avoid ex-post corrections, assuming a main network architecture of circuit-switching, digital switching exchanges, a maximum of two-tier switching (tandem and local switches with decentralized RAUs), usage of fibre in metropolitan areas, modern transmission technology, low capacity usage (different level of efficiency to that achieved in developed countries), lower efficiency from old assets, emergence of new alternatives to circuit-switched technology for carrying voice (still within the realm of conventional traffic).

The costs are conventionally broken down into direct costs (including the cost of capital and returns) and ancilliary or common and shared costs. The direct costs in turn break down into current equipment costs (i.e. not historical accounting values but those reflecting current market realities), operation and maintenance expenses (OPEX) and, where appropriate, research and development expenses. Ancillary expenses have to do with indirect costs, which are not common to all the services and must therefore be assigned by activity, and common costs without any traceable causal relationship with the production of a specific service, such as general administration, management systems, other research and development expenses and other taxes not included in the other costs. The revised TAL model assigns to regulatory bodies the responsibility for determining those common costs that are to be excluded.

Where the cost of capital is concerned, the model recommends taking the opportunity cost, but leaves it up to regulatory bodies to tailor this to their respective markets. Likewise for the calculation of OPEX, in the absence of detailed information, the model recommends use of a percentage *alpha* of the annualized investment cost of the asset.

For modelling ancillary costs, the recommendation is to use the detailed information provided by the operator or the "relevant best practice information". For common costs, an alternative is to use markup on equipment cost to denote common costs as a proportion of asset costs.

In order to construct the demand, the model assumes that the switching network will operate with a surplus capacity of 15 per cent, considering the maximum throughput at peak hours (busy hour call attempts (BHCA)), taking for that purpose data provided by the operator, or alternatively, if an estimate is to be made, the internationally accepted indices on the relationship between call attempts, successful calls and unsuccessful calls, as well as the indices for call waiting times, in order to determine the throughput in minutes. It is also possible to apply a correction to the market inefficiency factor. The model can also be used for the modelling of transmission costs on the basis of efficiency standards recommended by the regulatory body where competition in the markets is not in itself sufficient to establish levels of maximum efficiency (leading-edge technology) and considering the throughput of switched traffic on the basis of conversion coefficients for expression in Mbit/s (capacity or bandwidth). Also to be determined is the cost of the incremental interconnection traffic by adding the annualized cost of the additional equipment needed on the various links of the main operator's network, the OPEX expenses incurred and the relevant common and indirect costs associated with the distribution of interconnection traffic by means of that equipment.

In this regard, the revised TAL model recommends using the LEC (full costs) method in cases where the incumbent operator has sufficient capacity to carry the additional interconnection traffic. However, in cases where the additional interconnection traffic represents a substantial increase in expenditure to realize network expansion, it considers the IEC methodology to be more appropriate.

1.6 ITU's COSITU model

ITU has developed a cost model for determining tariffs for all services – basic local, long-distance, interregional and international telephony and interconnection including mobile and VoIP networks.

The COSITU model takes as its yardstick the burden of historical accounting costs, but updated to the market situation at the time of the calculation ("current costs"), beginning with a top-down methodology using data from the existing company. It can then be adapted to the theoretical bottom-up model using the "scorched node" approach.

The COSITU model considers that all services should cover the common costs and as such follows the enhanced fully distributed costing (EFDC) approach, using as a basis the costing principles of the ABC method and, as a criterion for the allocation of shared costs among services, the volumes of traffic carried. Since the costs considered are solely those that are endogenous to the network, exogenous costs will be taken into account only where they correspond to a transit expense that replaces transmission elements of the network under study (i.e. where such transit can be assimilated to endogenous elements of the network).

Inasmuch as the body of data in the model (which, once it has received those data, acts as a black box which generates results) is a key element in the study of a given network's costs, the validity of the results will depend on the appropriateness of the information supplied. This being the case, it is recommended that this procedure be based around the setting-up of a multidisciplinary committee (technical and marketing specialists, engineers and economists) with support from the organization (company) supplying the data.

It is necessary to input not only cost data pertaining to the network but also traffic data. In the event that detailed traffic data are not available (bearing in mind that the accounting regulations may not require that they be kept, and that in many cases companies keep only partial information in that regard), traffic tickets will be entered into the model in order to estimate actual traffic flows.

Although the COSITU model is based on the concept of full costs, which means that all of the services are allocated a share of the common costs, it is accepted that incremental costs may be taken into consideration for a given service (i.e. only the additional costs generated by the provision of that service) as long as they do not result in a price increase in the other services (although they assume the common costs) or generate anti-competitive arbitrage in the service whose incremental cost is being analysed.

This question is at the heart of the debate regarding the use of incremental costs for incumbent operator networks that are opened up to competition, since those operators have no wish to subsidize the entry of new operators by providing them with facilities at prices that do not allow for recovery of the costs incurred.

The COSITU model includes the adjusted calculation of capital depreciation, including currency depreciation; and, for calculating the cost of capital, it includes the expected rate of return in each market under the prevailing risk conditions as well as the "Beta" coefficient (volatility with respect to the median) of the returns from telecommunication companies (as compared with current cases in the capital markets of each region).

The model also introduces an efficiency variable in order to incorporate into the network whose cost is being studied the spare capacity coefficient and, as the case may be, the expected time-frame for effecting any expansion needed to accommodate projected demand.

In addition to all of the costs, grouped under "network components", "operation and maintenance", "functional support costs", "identifiable direct and indirect costs" and "other common costs", and to the traffic data, it is also necessary to input the tax components (profit tax) and universal service costs (if any).

Finally, COSITU introduces the notion of "access deficit" compensation, insofar as the fixed revenues derived from network customers do not cover the cost of the network's operation, making it necessary to compensate for that deficit – where it exists – by distributing its impact among the variable consumption tariffs applied to all of the services provided.

The COSITU model is intended for application in developing countries as a tool to enable the comparison of tariffs and costs and the possible rebalancing of tariffs and interconnection rates among the different operators of similar networks or between networks with differing characteristics.

The model is of an all-embracing nature and is therefore unaffected by technological choice, although this means that its usage must take account of the specific situation of each country, i.e. the "structural realities" of each market.

1.7 The debate on pricing approaches

1.7.1 Efficient component pricing rule (ECPR) for access tariffs

The efficient component pricing rule (ECPR) or Baumol-Willig method consists in setting the interconnection price by adding to the direct cost of the service the opportunity cost of the incumbent operator, such that the new entrant operator will make a profit (assuming that it sells its service at a competitive price) only if its cost is lower, and hence its operation more efficient, than that of the operator whose network it is accessing.

This approach implies maintaining the monopoly rent and thus contributes towards financing the access deficit. It also enables the interconnection service to participate in a system of cross-subsidies between services, if foreseen in the incumbent operator's price structure or basket of prices.

A criticism of this rule is that it does not foster competition, insofar as it maintains the rent of the former monopoly operator, or that it directly prevents competition if the new entrant operator does not have lower costs, which is something that should not always constitute grounds for obstructing its market entry since competition and/or the mere threat of competition can serve to drive down prices in the market, and a barrier thus created does not ultimately bring the consumer the benefit of lower prices.

1.7.2 Maximization of social welfare or Ramsay Rule

Ramsay prices are considered to be a second best, maximizing a social benefit function that takes account of the budgetary restriction (total revenue) of the incumbent which is selling the service (whether end services to the customer or interconnection services to third-party operators).

The Ramsay welfare function comprises the consumer surplus plus the company's profit (and, as the case may be, the new entrant operator's profit). Thus, the more the services on offer are marketed the greater the social benefit will be, with the consequence that price levels will be higher where

there is lower elasticity of demand, since consumers characterized by greater inelasticity will be prepared to pay more rather than consume less. By contrast, segments in which demand is more elastic will see lower prices (i.e. the price/cost difference will be narrower), since the quantities consumed would diminish more than proportionally were the prices to increase (although the prices would in all cases still have to cover the costs).

Elasticity of demand reflects the reaction to a price change in terms of quantities purchased. In the case of telecommunications, demand for the service comprises two parts, namely demand for access and demand for usage. Demand for access has to do with having the service in the first place, while demand for usage refers to the actual placing of calls via the network to which one has access. The two types of demand are complementary; in other words, a drop in demand for access caused by an increase in the access price will be accompanied by a drop in demand for usage (for which the price remained unchanged), while an increase in the usage price will likewise reduce demand for both usage and access.

Although the Ramsay rule seeks the economic optimum, it is criticized for not considering the situation of the different consumers within the welfare function. Stated in economic terms, this means that each one-dollar vote carries the same weight, regardless of how many dollars each consumer has to his or her credit and how much he or she expects to be earning, with the result that the purchasing power of the different social groups is not taken into account by this rule. Although it is possible to design a different welfare function in which the consumer surplus to be maximized is weighted according to the different levels of purchasing power (in order, for example, to favour low-income groups), incorporating such a subjective appraisal within the model would be quite a complex matter and would throw up innumerable political issues for the regulator.

In practice, it is business consumers and consumers with the greatest purchasing power who enjoy the broadest range of service options and whose consumption is therefore characterized by greater elasticity of demand, it being for this reason that the Ramsay approach has seen little in the way of practical takeup on the part of regulators.

Another criticism, more technical than political, has to do with the need to have access to relevant data regarding not only the operator's costs (or those of several operators where there are new market entrants in addition to the incumbent), but also the demand functions, this being an area in which even the operators themselves may have limited knowledge, particularly in the context of developing economies where income and price stability are affected by various factors which make it even more difficult to estimate those functions despite having the demand (traffic) records to hand.

Demand studies show that demand generally tends to be more elastic in the case of longer-distance segments and of business users as opposed to individuals, in all services. This is another reason why regulators are not very inclined towards the Ramsay approach.

Laffont and Tirole put forward a further adjustment to the Ramsay rule by introducing into the interconnection price a contribution to the access deficit that is similar to the contribution made by the end consumers of the incumbent's services.

While it is recognized that the Ramsay approach contributes in theory to the efficient attribution of resources and production of services, it is ruled out in practice on account of the above-mentioned criticisms.

1.7.3 Price-cap regulation

This consists in the determination of ceiling prices for each service (particularly in non-competitive markets), to which end information regarding the cost and demand functions of each service has to be available. Obtaining this information is no easy task for the regulator, even at the most accessible

and direct level of fully distributed historical costs. At all events, the regulator may find it easier to obtain overall information regarding the incumbent's total costs and on that basis draw up an estimate of its profitability.

This being the case, Laffont and Tirole propose, by way of an alternative, setting a figure for the revenue derived from all of the services, i.e. for a "*basket*", by determining a total maximum income based on a projection of expected demand. This enables the operator to set its prices within a given range according to the relative weight of the quantities of the different services sold.

This alternative, known as global price cap (GPC), has been applied in the United Kingdom, followed by other markets. Price regulation by means of the price-cap approach is also known as IPC-X – an algebraic expression for determining the annual movement of tariffs with respect to the base period or point zero by means of the difference between inflation (IPC) and the efficiency adjustment (X). It is the inclusion of a revenue-reducing efficiency element that enables us to approximate, over time, the historical cost levels adopted at the baseline for the purpose of determining maximum income, to the ideal forward-looking cost standard or model, without this affecting the operator's profitability or providing a clear idea of those objective costs.

Although the overall price cap places a constraint on the operator's ability to secure higher margins (higher prices) in those markets where demand is most inelastic, it will unquestionably be able to benefit from the flexibility afforded to it by the basket, particularly where the annual demand projections are corrected only for the subsequent period.

It is this that prompts some of the criticisms that are levelled at this model, on top of those pertaining to the use from the outset, not of optimum costs, but of historical costs or costs that are approximated to the standard. This is because, here again, we are dealing with demand data that are imprecise and which would require specific processing to make them fully accessible.

A number of regulators consider that a way out of this situation would be to provide for a "refund" of any plus differences obtained; however, this may also make it necessary to compensate for minus differences should that turn out to be the final result, all of which would introduce an element of uncertainty on market prices – a prospect that would appear even less advisable. What is more, plus differences in revenue can also be the result of improvements in service quality and of other effects stemming from greater efficiency on the part of the provider, it being precisely this that justifies the annual price cap minus an X factor. Taking this scenario to the extreme, a provider facing the possibility of having to make refunds would limit its efficiency adjustments to the point of obtaining compensation for the reduction in X and no further, since otherwise it would be opening the door to the possibility of having to give away the surplus derived from its cost-cutting efforts.

From another angle, the flexibility of the basket may tempt the operator to practice predatory pricing in segments where it foresees greater competition, in order to discourage it. In extreme cases, the operator may arrive at an EPCR price. There is therefore speculation as to whether a price cap should not be set only for competitive services. However, non-competitive services would also need to have a price cap in order to control any possible abuse of dominant position – so this does not resolve the problem.

1.7.4 Cost-oriented regulation

Cost-oriented regulation is the most widely-accepted case, even though no global solution has to date been found to the problem of the cost study (cost model) that would make it possible to determine accurately the LRIC in each market. Markets differ from one another, having different topological and demographic characteristics and hence different field costs, irrespective of whether they use similar network design technologies. On the other hand, the idle or surplus capacity in the model will stem from other characteristics that are inherent in each market, such as the actual

situation of the incumbent or dominant operator and the degree of accuracy of projections in regard to demand evolution. Although the incremental cost remunerates all of the surplus investment, the economies of scale will ultimately depend on the size of the network designed, with the result that these factors will have an impact on costs, even where these are theoretical, forward-looking and based on maximum efficiency. This is on top of the recognition of existing nodes for construction of the standard model, which will thus end up being specific to each market.

It is, moreover, considered that cost-oriented prices should be non-discriminatory between requesting and reciprocal parties in the case of interconnection prices.

Thus it is that, when setting prices on the basis of costs, account is not taken of operators' pre-existing tariff structures. It is possible, where cross-subsidies exist between services (a typical feature of State monopoly operations until the early 1990s), that the process of setting cost-oriented prices will call for a considerable ***rebalancing*** of tariffs ahead of their actual implementation.

An alternative to the extreme position (determination of interconnection prices at the LRIC level) involves the setting of price ranges with a maximum ceiling price that is given by the standalone cost where there are no economies of scope in the absence of any joint production of services, and a minimum or floor price given by the TLRIC. If the floor prices are defined as TSLRICs per unit or average incremental costs (AIC), then prices should be above the floor levels, such that each service contributes to the common costs of the service and to the company's overhead.

Taking the TSLRIC as a floor level in a competitive market can be defended in that it serves to ensure the absence of revenue transfers or cross-subsidies to competitive services from those that are less competitive. Additionally, new entrants can request, by way of a competitive safeguard, that the floor prices of all functionalities, whatever their use or purpose, be attributed within the floor prices of all of the dominant provider's "bottleneck" services (i.e. those provided on a monopoly basis), thereby making them the same for all users, namely the dominant operator and its competitors. The price of the functionalities (or "essential facilities") must be in line with the TSLRIC of which it forms an input and should be the same as the element price charged to other providers.

Nevertheless, the range and hence the ceiling that stems from the SAC (single-production standalone cost) is justified inasmuch as it is understood that the incumbent provider, like any other, has the right to derive benefits from its own economies of scope associated with joint production; if it finds itself tied obliged to TSLRIC floor prices, it will give up not only its economies of scale but also such economies of scope. And it has the logical right to benefit from its economies of scope vis-à-vis any competitor.

1.7.5 Regulation based on best practices

This approach consists in the use of benchmarking with respect to the price levels found in comparable markets characterized by lower prices for the various services and facilities.

Implicitly, the application of best practices results in a cost-oriented model, inasmuch as those markets that have successfully imposed best prices (i.e. without this causing any major controversy in the market) are certainly positioned closer to more efficient costs than the other markets.

Lastly, to the extent that the theoretical standard of the incremental cost model calls for estimation, the use of benchmarking would be an indirect method for achieving the same objective, i.e. for arriving at a "proxy" value of the ideal that is not real but fictitious.

The advantage of using best practices lies in the ease of access to information, its wide availability for all the parties involved in the regulatory process, and hence the low cost of implementation.

The customary criticisms are aimed not so much at the notion of the advantage of considering best practices, as at the actual difficulties involved in effecting an adequate comparison. As with engineering models, the comparison exercise needs to take into account the differences between the various markets, with a view to considering only those of a similar nature, if any.

Furthermore, even when taking only the best current prices in markets that are comparable in terms of type and size of network, levels of demand and other essential characteristics, economic realities are such that the conversion of currency at free market exchange rates (other than in markets which share a given currency) is skewed by the situation of financial movements of capital, which in the short term are the factor which drives cash exchange rates.

Aware of this situation, the proponents of benchmarking have thus introduced, as in other similar comparisons, use of the parity exchange rate which better compares the economic realities of countries by virtue of being an exchange rate based on the actual sector rather than a monetary one.

An adjusted variation on this latter alternative is to average the conversions (current financial exchange rate and purchasing-power parity exchange rate) for developing countries on account of the strong imported component of telecommunication network costs. Indeed, the operator will in any case pay the imported part of its costs at the current exchange rate and will therefore require that its revenues cover that part of the cost independently of the parity exchange rate.

1.7.6 Other considerations in relation to pricing

In the area of interconnection, the concept generally advocated is that of ***reciprocity***, i.e. that two networks having two-way interconnection will mutually agree on the ***same price***. On the basis of this approach, moreover, it would be possible to ***allow the parties total freedom to set the interconnection price***.

If the two operators do not have equal market power (this being more often than not the case since there is normally an incumbent operator that is also dominant, at least where telephony networks are concerned), it can then suit the entity that is in a position to impose interconnection prices to adopt a policy of setting them at a higher level so as to prevent the new entrant from charging competitive end prices to the user. At the other end of the scale, where two operators have a similar level of market power, they could collude in setting prices which amount to simple remuneration for them but have the effect of excluding other possible competitors.

For this reason, although regulators normally require an agreement between the parties as a first step, they set at least ***reference values***, as well as, in most cases, a ***reference interconnection offer on the part of the dominant operator***. As an additional measure, it is normally required that interconnection agreements be published as a means of guaranteeing the principle of non-discrimination. In all events, that guarantee implies a number of controls vis-à-vis the operators, inasmuch as they could agree on other forms of settlement unrelated to the interconnection contract in violation of the aforementioned principle.

In the case of networks of differing types, where the most common case is that of interconnection from fixed to mobile and mobile to fixed, the principle of reciprocity may be interpreted as ***reciprocity of approaches but not of prices***, that is, for example, both prices are subject to standard costs, one pertaining to the fixed network (interconnection to that network), the other to the mobile network (interconnection to the mobile network).

This implies, as is attempted in some markets, an additional study of costs (possibly also incremental costs) on mobile networks. Other markets have taken the view that the study of standard costs for fixed networks is already complex enough without also studying the costs of other networks providing new services.

In such cases, the tendency is once again to use reference parameters. If the price of a given network does not reflect (i.e. is very much higher than) the cost, the network that is paying a higher relative price for interconnection thereto will be subsidizing its users, with the result that there will be no incentive to seek technical innovation and efficiency, encouraging growth of the subsidized network, which will be able to offer its customers prices below equilibrium.

In view of this problem, and in an attempt to resolve it, Australia has set the prices for accessing GSM networks on the basis of the current prices charged to their customers, such that those values filter through in determining unsubsidized access prices. This regulatory approach is based on the assumed existence of a high level of competition in the GSM network user market, with prices thus tending to be cost-oriented, and on the further assumption that the same will be the case for access prices.

More recently, the United States' regulatory body, the Federal Communications Commission (FCC), has been orienting the network interconnection model towards a zero value, equivalent to a ***bill and keep*** system, whereby third-party interconnection costs are recovered through the prices charged to the network's own customers, even though the costs for interconnecting that network with other networks are equal to zero. If the traffic between networks is balanced, the result would tend to be neutral. This type of regulation eventually discourages the generation of traffic imbalances, i.e. businesses engaged solely in call termination, although it rewards origination.

Finally, to complete this review of the most commonly used approaches in the area of reference price regulation for the use of networks, we would note that the mean value (price per unit), which is generally expressed in terms of usage time, can be modified in favour of ***units based on the capacity used***. This idea is based on the fact that it is the quantity of circuits used during the periods of highest traffic (peak hours) that determines the higher interconnection cost, which does not reduce in proportion to the lower level of network usage measured in units of time during periods of lower traffic. It would therefore appear more appropriate to establish unit values on the basis of the capacity or quantity of the circuits used. This approach could be expanded to other network facilities.

The difficulty of this method, apart from introducing the change, lies in finding a suitable way of making this measurement in terms of capacity. If achieved with the assent of the market participants, this could constitute a step towards reducing the difficulty of designing standard incremental costing models with a certain degree of idle capacity.

1.8 The problem of information asymmetry

In principle, the original source of information on service costs lies within the regulated companies themselves, particularly the incumbent, inasmuch as a basic telephony service monopoly, or at least a dominant company, exists within a given geographic area.

Economic theory points to practical reasons why the regulated party (a passive subject) may not wish to provide all of the available information to the regulator, quite apart from the fact that the way in which that information is presented will be based on the accounting approaches followed by the company in question, which may not match those followed by the regulator, particularly where tariff management is concerned.

In that regard, and based on the views of Jouraviev (CEPAL, 2003), regulation may be seen as a "strategic game" in which the "agent" (the regulated company) seeks to maximize its profits and the "principal" (the regulator) has to maximize the general welfare.

Having the necessary information at its disposal provides the agent (the operator) with a tool for achieving its objectives, whereas the principal which does not have that information in its entirety or in the required form for the purpose of conducting its work will ultimately find its path strewn with obstacles.

This differing degree of accessibility to information is termed "information asymmetry" and has nothing to do with the agent's good or bad will, although it goes without saying that the manner in which that will is exercised can serve to mitigate or exacerbate the phenomenon. Without adequate information, the principal's decisions will be taken with a high degree of uncertainty, with the result that its task of preventing monopolistic abuse and of fostering efficiency through the setting of optimum tariffs (within regulated services) will be impeded.

According to Jouraviev, information asymmetry has two sources. One of them lies in the problem of "concealed activities", which refers to information held by the company in regard to variables that are endogenous to it and which gives rise to a "moral risk" (the risk in this case being that the information might be used to serve the interests of the regulated party rather than the general well-being). The other lies in the problem of concealed information which the regulated company may hold in regard to exogenous variables on which it can exert no influence but from which it could derive benefit on the basis of its superior knowledge, thereby giving rise to a situation where the wrong decisions are being taken (from the point of view of what the regulator is trying to achieve).

An example of the first type of source would be the outcomes of cost adjustments made by the operator; while an example of the second type is the advantage that the operator has over the regulator in terms of in-depth knowledge of technological innovation and the latter's impact on its business.

Information asymmetry occurs to differing degrees and for differing reasons that do not always have anything to do with the difference between the regulated party (the company) and the party responsible for regulation (the regulator). In principle, and according to Jouraviev, its causes include:

1) The ownership difference, whereby regulated companies not owned by the State have no political commitment to the regulator's objectives, other than maintaining a good business image. This difference is compounded by the differing budgetary capacities of the two parties: the company may well command all the resources it needs to pursue its task, whereas the regulator normally has to carry out its functions within a pre-established budgetary envelope. An extreme situation that can arise out of this discrepancy, and one which the lawmakers must be at great pains to avoid, is that of a "captive" regulator.

2) Inadequate clout on the part of the State's regulatory body, either for the want of sophisticated enough technology or on account of piecemeal progress in the area of privatizations and subsequent policies. Indeed, the initial aims of liberalization appear to have been focused on opening up the field to private initiative, while the setting of cost-oriented tariffs, the exercise of control over non-competitive markets and the adoption of policies designed to foster competition, etc., appear to have come about later rather than at the same time. More recently, regulators have been finding themselves drawn towards reliance on alternative mechanisms that do not depend on the information provided by the regulated party; however, such mechanisms do not always lie within their reach and do not constitute an adequate alternative.

3) The degree to which activities have become diversified, which, together with the growing complexity and expansion of the many types of service, has made it difficult to keep up with the technical aspects of accounting separation and assignment of costs to activities, not to mention the difficulty of determining the specific costs pertaining to each regulated activity (service), particularly those subject to price controls.

4) The rapid pace of technological change, which has a similar accelerating effect in terms of the time-frames involved in the depreciation, accounting and use of assets, etc.

5) The increasing number of data sources, which now, in addition to the regulated company's accounting records, include those of other market players, of service providers, the comparative accounts of other markets, etc.

To this general context we may add a further explanatory observation in regard to the situation that prevailed in various countries of the region in the 1990s, namely that the regulatory body did not always clearly define the scope and purpose of its request for information, which could be as broad as it was unspecific (all and any type of information). In this case, operators simply do not have the type of accounting approach that is liable *a priori* to satisfy the regulator. Conversely, where the regulator expresses very precise requirements, this may result in additional costs for the operator that it is not always prepared to shoulder.

In order to overcome such difficulties, it is essential to define the scope of the powers that the regulatory body can exercise when requesting information from those it regulates (including submission deadlines and periodicity, sanctions for non-fulfillment, and audits), as well as the regulatory accounting model it wishes to have used.

1.9 Regulatory accounting

Capturing the basic information that the regulator requires and which is held by the operating companies calls for the establishment of a regulatory accounting approach that is in line with the regulator's objectives, which have primarily to do with securing details of the total costs per service and per unit, the levels of idle capacity, the demand (traffic) and revenue under the different headings, the shared costs of equipment and facilities and common and joint costs of all services, the technologies used, the quality-of-service indicators, and investments.

Regulatory accounting can thus be seen as a tool which renders the information transparent and ensures that it is compiled and prepared in an orderly fashion, while at the same time establishing clear and specific guidelines for the regulated party (operator), in accordance with which it must prepare and submit its information for regulatory purposes. In this way, the provider itself will likewise obtain a more complete picture regarding the economic foundations of its business and of the impact that the regulatory economy is having and will have on it, thereby eliminating or at least limiting the effects of any possible discretionary behaviour on the part of the regulator.

Regulatory accounting must *start out from* and remain *consistent with* the conventional general accounts that the company regularly draws up and which are subject to independent external audit, quite apart from any audits that the regulatory body may itself require.

The difference between the two types of accounting has essentially to do with their different objectives, with the agreed point of departure in regulatory accounting being the principle of cost causality (as described earlier). However, there is no reason why regulatory accounting, once introduced into the company, should not in itself come to serve as a very useful tool for decision-making in the business context, rather than just meeting the needs of the regulator. One example of this is to be seen in the recommendations emerging from international consultancy studies on the appropriateness of using incremental cost analysis to monitor profitability and allocation of resources by product line.

The general principles that regulatory accounting has to satisfy are:

- *relevance* –the ability to produce the economic data necessary for decision-making and, in this case in particular, for properly determining the costs of services, to which end it is necessary to ensure that all of the necessary validation procedures are adhered to during the process of preparing information;
- *reliability* – the information must be free from any discrepancy or material errors and from the influence of any factors other than those stipulated by the regulator, must be a reasonable representation of what it sets out to provide, must be drawn up with care and must be complete;
- *comparability* – in order to be consistent with the corresponding information for different periods and ensure that the allocation criteria are similar and at all times are applied in a transparent manner such as to enable understanding of any changes made, although it is recommended that the allocation criteria remain stable through time;
- *materiality* – in accounting terms, this refers to the relative importance of the information's level of detail vis-à-vis the observed phenomena;
- *subjection to audit* – that is, that the information has been duly and independently tested to ensure its consistency with the conventional accounting information contained in the financial reports (shareholders, stock markets, etc.), to which end its *integrity* shall be verified to ensure that all sources of information have been made available to the auditor and that the latter has had all of the necessary means for its task, which in many cases, in addition to being carried out by independent professionals, may be carried out by the regulatory body itself on a complementary basis.

A key element in the regulatory objective is to determine the cost per unit of product in each service, to which end the regulator must in turn establish: the *basic principles of regulatory accounting*, taking into account the general principles of cost causality, objectivity, transparency and consistency; the *specific cost-allocation parameters*, i.e. drivers, capital equipment depreciation factors and cost of capital, among other elements which, as we have seen, are not necessarily in line with those found in conventional accounting; the *basic criteria for transfer costs*, i.e. the proper posting of the services and facilities provided within the company to the various outputs obtained; and, very particularly, the *cost methodology adopted* (i.e. historical, current, forward-looking, fully-distributed, incremental, etc.).

The basis for regulatory accounting is considered to lie in the ***accounting separation*** principle, which is defined, within the framework of a competitive regime, as a set of practices, procedures and accounting techniques such that the records can be applied in order to elaborate information that is consistent with the obligation of non-discrimination and the absence of anti-competitive cross-subsidies.

The separation of accounts by service has to do, moreover, not only with cost causality but also with the concern of ensuring proper competition in services participating in a market in which there are other offers, in order to avoid, for example, cross-subsidies, predatory pricing and other anti-competitive practices.

In many cases, full accounting separation between services may be required, although in extreme circumstances, and even at the risk of constraining economies of scope, some regulations require the business separation of operations, which may call for divestiture or ex-post separation if the operations of the various services subject to the separation requirement have been produced jointly

from the outset. An example of this may be found in a number of regulatory frameworks which do not allow a company providing fixed telephony services to operate in the mobile telephony sector, although this does not bar a shareholder in the first company from owning a separate company providing the other service.

The key issue in regulatory accounting is the accounting separation of services, which in turn have to be clearly defined together with the cost allocation criteria. This implies both the establishment of drivers for the costs associated with the operation of the various services and in many cases determined by physical units (for example, traffic volumes, usage times in the different services, person-hours worked by staff engaged in each operation, etc.), as well as criteria for the allocation of shared costs. The theory does not specify a single cost allocation approach since, as we have seen, there are four main approaches (see the section on FDC) and one general principle (the allocated cost must have a floor level given by the incremental cost and a ceiling corresponding to the standalone cost).

A commonly-recommended alternative to the FDC approach is activity-based costing (ABC), for which the various cost accounting concepts have to be broken down in respect of their component activities, in order to identify which activities for each type of cost correspond to each service (in many cases with additional criteria for the allocation of costs among activities shared by more than one service). In short, the problem of allocating shared costs cannot be fully eliminated by the ABC approach, which, being also more complex, may find itself relegated vis-à-vis the FDC approach.

A regulatory cost accounting system is in practice a set of rules which underpins the allocation of costs, revenue and the capital used in the services considered separately (i.e. individually), so that the regulatory ledger meets the regulator's objectives, particularly compliance with the cost causality principle and the ability to ensure/check that the (regulated) prices of the services are duly cost-oriented, as well as due application of the principles of competition (discrimination, cross-subsidies and other practices pursued for anti-competitive ends).

Regulatory accounting must, moreover, make an effort to update the values of the historical records, which, although having the advantage of being more readily accessible, may not represent the true value of the necessary assets at the time of the analysis (see the sections in this chapter relating to "historical costs", "forward-looking costs" and "current costs").

Where this updating effort is carried out, and given the existence of the many factors that have a bearing on the changes between historical and current costs, from the updating of technologies and processes to the economic changes which modify the market values of equipment and other facilities, property and land, as well as the cost of capital (including the risk rate of each market), the parameters to be used have to be transparent and objective and must relate only to some of the above-mentioned factors.

The task then is to establish, for the purposes of regulatory accounting, principles for valuing the assets to be used (**regulatory asset base (RAB)**), which will not necessarily coincide with the accounting figures, since the regulator could decide not to accept the purchase values (for example, if it considers more economic technologies to be available) and/or the depreciation periods applied by the operator, in addition to which it might decide to check on whether the investments are related to the quality of the services, whether or not there is excessive idle capacity, in this case due to overinvestment, etc.

Regulatory accounting also requires revenue data by type (subscription, connection, usage time) and by service, as well as quantitative data relating to, among other things, traffic, capacities used and investment plans.

The regulator must design a format to be adhered to by operators required to submit information, so as to facilitate proper preparation and submission of the data and to have a single format for the purposes of comparison.

The rules establishing regulatory accounting must therefore be very specific, rather than generic, where the provider's obligations are concerned. The regulations should, moreover, provide that, just as the information is subject to independent audit, the regulator may, as it sees fit (preferably on a regular basis) also conduct general (full) or specific audits on the company's accounting or non-accounting records (among those required, such as traffic).

1.10 "Intermediate" reporting mechanisms

Obtaining regulatory information is in practice a process that is constantly undergoing refinement, as the regulator is itself able to adapt to the technical approaches advocated by international theory and practice.

The use of efficient costs, for example, has been widely discussed by operators, particularly in the context of privatization processes, where they found themselves dealing with companies with certain carried-over costs whose correction required some time. In addition, technological innovation can render obsolete and less efficient a technology which, at the time of the purchase decision, was the most up-to-date available. There are many such examples, which companies subject to regulation are in the habit of quoting when objecting to any deviation from the regulator's decision in regard to the recorded (historical) costs.

One item that can lead to serious controversy is that of the cost of capital. For developing-country operators, a "reasonable" return is much higher than the corresponding estimate normally made by governments, particularly where the rates of return are influenced by additional risk rates applied by the capital market when measuring comparative returns from assets at the international level.

Even more controversial (although accepted by the key regulators in the northern hemisphere) is the application of long-run incremental costs, particularly where the costs incurred are identified by means of the bottom-up rather than the top-down approach, where the existing network is the data source. Operators tend to challenge the LRIC model and to call for the recognition of common and joint costs incurred. The United States regulator, FCC, recognizes a part thereof with the TELRIC model, which in any case is applied to interconnection and facility prices, while the tariffs to the public are regulated by bodies operating at the individual state level (FCC being a national body), using various approaches including discussion with the users.

The principle of regulation in respect of an ideal (fictitious) company seeks to overcome the problem of information asymmetry. However, its practical application has not advanced at the same rate as its conceptual development.

Alternatively, regulators may have recourse to market comparisons in order to establish orders of magnitude that allow for the correction of possible major variances between prices and the theoretical maximum efficiency values. We have seen that international benchmarking is a current practice. Another alternative is to seek other values in the market itself and, possibly, competition prices (or, failing that, the threat of competition) as a means of discouraging any abuses of dominant power.

Some administrations are in favour of hybrid models, which start out from regulatory accounting on the basis of the incumbent operator's historical records, with the subsequent application thereto of corrections based on other values derived from ideal models, international benchmarking or competition in the market. In such cases, a key factor can be the operator's willingness to provide

the best possible information, duly substantiated, with a view to explaining to the regulator, as necessary, the reasons for any variances in relation to other ideal values or values from other competitive markets. Where this is the case, the regulator will be in a position to act on the basis of sound information.

1.11 Preliminary conclusions

The principle of cost causality underlies the task of price regulation in telecommunications, although there is considerable debate as to which costs should be used and which approaches will maximize the general well-being, this being the natural objective of regulation in non-competitive markets, principally on account of the existence of incumbent telephone companies with significant market power, in some cases enjoying an absolute monopoly.

At the theoretical level, there is widespread acceptance of the LRIC concept as the basis for pricing, with discussion on the margins accepted for operators, although in practice one finds various alternative models.

If they are to be applied properly, LRIC models based on fictitious efficient companies (engineering design) require a zero-based approach in a given country, or, failing that, major adjustment efforts to ensure the adequate tailoring of models constructed without taking account of specific territorial features.

Regulatory accounting should establish clear and objective bases with a single format for the gathering of data by regulators, whether they decide in favour of an approach involving the application of historical costs, or whether those data merely constitute the basis for the construction of ideal models of the bottom-up type. There are also hybrid approaches which, in addition to the cost information provided by operators, inject other reference values for the purpose of pricing.

Regulators will probably have to advance by stages, pending the full incorporation of theoretical models, starting from the reality of their economies, the historical costs obtained through serious regulatory accounting and without discarding other alternative reference tools like competition regulation and benchmarking.

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CHAPTER II

Diagnosis: application of cost-based tariffs and use of cost models in the region

2.1 Results of survey

For the purpose of preparing a report on the regulatory situation in the region with regard to service prices, cost accounting and the possible use of cost models, this project has included the development of an ad hoc questionnaire addressed to all TAL Group administrations in the format presented in the annex to the final report. The replies received were supplemented with data from alternative sources, in particular the information available on ITU's ICT EYE database (http://www.itu.int/ITU-D/icteye/), as well as the databases of regulatory bodies of the region, reports of the Asociación Hispanoamericana de Centros de Investigación y Empresas de Telecomunicaciones (AHCIET), OECD, ECLAC, CITEL, the World Bank, FCC, IRG, Regulatel, and other works whose authors are referenced at the end of this chapter.

In general, it is noted that administrations in the region set:

a) fixed telephone service tariffs for the end consumer of where there is insufficient competition;

b) price caps for the charges which operators pay one another for interconnection (access) to different networks, particularly where mobile and fixed telephony are concerned;

c) prices for the lease of basic facilities on the public telephony network (local and long-distance).

In the case of prices for interconnection and facilities, amounts tend to be indicative or even maximum, since most regulatory frameworks consider "agreement between the parties" to be the first stage of negotiation, with only the absence of such agreement entailing appeal to the regulator or to other appeal bodies (usually courts of law) as the case may be.

On the other hand, the main regulatory approaches of administrations in the region have experienced some revision inasmuch as the majority now adhere to the principle of cost-based pricing in markets where pricing is not free. Thus, in the case of interconnection, despite the numerous examples of appeal with regard to agreements between parties, extensive pricing guidelines also exist for network access and interconnection.

As to price-setting approaches, the statistics taken from ITU (source cited) provide a significant sample of the situation that prevails within the region, and reveal that:

1) In markets not characterized by broad competition, in 70 per cent of cases prices are regulated by the State (mainly through a specific telecommunication body), with most countries regulating them on the basis of costs, while benchmarking is also acquiring importance as an alternative means of setting prices.

2) Most of the administrations (82 per cent) indicate that they have embarked on tariff rebalancing, while almost two-thirds of them consider the process to have been completed.

3) Services with free pricing generally come under the heading of mobile telephony and PCS (excluding access or interconnection to mobile networks), data provision and Internet. Fixed-mobile interconnection or access is regulated in 60 per cent of cases.

4) Fifty per cent of administrations provide for the financing of universal service obligations through contributions made by operators into a special fund.

5) Although a large proportion of administrations indicate that they have adopted the cost-based pricing methodology, only 22 per cent actually have models and 44 per cent rely on the operator(s) providing them with results. Furthermore, historical costs are used in the majority of cases (82 per cent), with the remainder either using the current costs approach or seeking to introduce LRICs.

6) As to allocation approaches, 44 per cent use the FDC (fully distributed costs) approach, while 55 per cent use ABC (activity-based costing).

7) The majority of administrations orientate their interconnection prices. Fifty per cent set them directly, while in 30 per cent of cases the amounts are based on costs reported using a cost separation methodology imposed on operators.

In general terms, and complementing the above statistics with relevant case information drawn directly from the documents of countries' administrations (see § 2.2 below), it may be noted that in the region:

a) there is a growing trend towards the incorporation of cost measurements for the correction or setting of service prices and access rates, which in previous stages (privatization) appear to have been based on orientation to historical values updated by price indexing (price caps) and operators' reports;

b) in various cases, benchmarking allowed adjustments over time;

c) more recently, i.e. from 2000 on, administrations have shown a tendency to study LRICs, although for the time being they are at the implementation stage;

d) the use of models is foreseen in various regional regulatory frameworks, even though most progress has been made in the compilation of accounting information based on data from operators;

e) some administrations have contracted out, or are in the process of contracting out, the elaboration of cost models for basic (fixed), and to a lesser extent mobile, telephony;

f) in a few cases, the VoIP service – which, according to ITU statistics, is explicitly prohibited by 30 per cent of the administrations – is regulated.

This last observation, combined with the cost study being undertaken by administrations in regard to existing networks, would appear to indicate that the cost models have thus far not taken account of the impact of the possible migration from circuit-switched networks to next-generation, packet-switched networks. It would thus be appropriate to evaluate how this evolution affects existing networks and its impact on the models that could be introduced.

Those administrations that opted for the possible introduction of cost models for future tariff-setting have stressed the specific characteristics of their networks and the features peculiar to their territories (density and topology), which leads to the design of ad hoc cost models. In some cases, however, international models have been adopted.

It should also be noted that administrations have been or are confronted by natural political and social restrictions when it comes to price adjustments (including tariff rebalancing) where such adjustments are major; these circumstances have limited the action of regulators, resulting in decisions being put off, or in alternative, "second best" solutions being negotiated or agreed to.

2.2 Selected cases of cost-oriented tariffs and cost models in the region

This section presents an outline of tariff regulation approaches and procedures in selected TAL Group countries. The alternative sources were used for all cases except Bolivia, Costa Rica, Ecuador, Dominican Republic, Peru, Paraguay and Uruguay, which replied to the questionnaire within the deadline (Venezuela was not included, as its responses report tariff data only).

Argentina

Tariff regulation for the fixed telephony service was based on the price-cap approach following rebalancing effected in 1996. In addition, in support of the initial rebalancing, the annual price cap in force for the basket of service prices was applied during the following periods in a selective manner, with discounts solely on local long-distance and international services. Also, following various updatings, the interconnection tariffs were established in 2000 based on benchmarking, whereas prices for fixed and mobile access were set for customers in accordance with the average values estimated for mobile networks.

In 2002, the regulated tariffs were frozen; this included not only the prices charged to the public for fixed telephony, but also the rates for interconnection and the lease of network components – although the latter were subsequently partially adjusted for inflation, whereas the freezing of public tariffs for the fixed telephone service was maintained. Tariffs for all other services remained free.

The regulations nevertheless require that there be an appropriate relationship between interconnection charges and costs, to which end, within the normative framework in question, a future study of LRICs is foreseen. The same approach is to be used for calculating the net cost of universal service, using the United States FCC's HPCM hybrid cost model for the purpose.

In 2004, the regulatory authority decided to undertake a new study of costs based on the historical costs taken from the accounting registers of the fixed network incumbents, although those costs could be corrected. The administration subsequently indicated that it had virtually completed a cost model, although it did not provide information on the results of the studies[4]. This year it was announced that an agreement on tariffs had been concluded with the fixed network incumbents, although its content is not known, nor is it known – if eventually it is implemented – whether or not it will include the setting of new interconnection rates. Meanwhile, the administration maintains the principle of cost-based prices.

Bolivia

Basic service tariffs (fixed and long-distance national and international telephony) are regulated for dominant operators on the basis of the price-cap system, with regular adjustments for inflation and improved productivity. Interconnection tariffs are also regulated. In all other cases (non-dominant operators) and services, as a general principle tariffs are free.

The incumbent local service operators are basically local cooperatives, whereas Entel is the main long-distance service provider. Mobile services are also provided by Entel in competition with other, private operators. The universal service obligation is one of the objectives that is mandatory for local operators.

The regulations stipulate that price caps must be cost-based. To this end, basic service operators are required to provide information on costs using a specific format entitled "Uniform Accounting Financial Information System" (SIFCU). The system requires that operators' accounting be based on accounting separation and the allocation of common costs by activity, setting parameters for allocation between activities. In short, the activity-based costing (ABC) method has been adopted.

The cost study foresaw the use of historical costs and the adoption of incremental costs based on the bottom-up approach. The cost information prepared by operators is based on historical data but the value of assets can be updated.

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[4] Presentation by the Administration of Argentina at the "Regional seminar on costs and tariffs for TAL Group member countries", Buenos Aires, Argentina (June 2005).

Benchmarking vis-à-vis other Latin American countries is also used as a source of reference. The Bolivian Administration has expressed interest in the availability of broader benchmarking that is thus more representative of average values in TAL Group countries[5].

Brazil

In Brazil, two periods of tariff regulation are to be noted: the first began with the privatization of fixed telephony services starting in June 1998 and ending on 31 December 2005; and the second corresponds to the renewal of licence contracts, from 1 January 2006 to 31 December 2025. The first stage was subject to a price cap regime established by the regulatory authority, including tariffs for the use of fixed and mobile networks (access) updated by the inflation index minus a predefined annual hedge. In June 2003, it was ruled (Decree 4733) that "interconnection and unbundling tariffs will be determined through the adoption of a long-run incremental cost model, with the economic conditions necessary for the ongoing fulfilment of universal service goals by licensees being maintained".

The interconnection tariffs based on long-run incremental costs will apply as from 1 January 2008, whereas in the intervening period from 2006 up until that date interconnection tariffs will be limited to maximum percentages (50 per cent and 40 per cent in each successive year) of public tariffs for local network usage.

By means of a public hearing process, the regulator approved the Regulations on Separation and Allocation of Accounts (RSAA) and provided that operators were to submit an Accounts Separation and Allocation Document (ASAD); this applies to fixed switched telephony service licensees and to those holding significant market power in the provision of fixed switched service network interconnection, mobile service network interconnection and industrial dedicated line services. Licensees and operators of fixed telephony networks are to submit the ASAD in 2006, but no date has yet been set for submission by mobile service operators.

The ASAD comprises three information blocks. The first is based on historical costs according to the fully allocated costs (FDC or FAC) model; this calls for division of the company into business areas and product lines, followed by the allocation of revenues, costs, assets and liabilities to the different business areas, products and network elements. This methodology is based on the ABC approach, whereas the cost of capital is calculated using the WACC approach.

The second block is prepared on the basis of current costs, to which end an attempt is made to establish the parameters required for transforming the historical costs into current costs for the products (services) supplied by the companies. This new basis is constructed having regard to the efficient use of resources based on the existing network.

The third block comprises the LRICs of the network elements and products. This calls for the construction of cost-volume relationships in order to determine the amount by which the long-run cost increases following an increase in the supply of a given network element or product. This presentation relates to top-down modelling on the part of the operator, the results of which will be compared with those obtained using a bottom-up model developed under contract for the regulator. Once the two have been compared, the aim is to reconcile the results.

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[5] The second part of the questionnaire sent out to administrations was intended to gather basic information for the development of, *inter alia*, regional tariff benchmarking. As few replies were received in this phase, that objective was not achieved and should be realized at a subsequent stage.

At present, various actions have been set in motion with a view to successfully completing this process, including a mechanism for consultation between the regulator and companies in order to deal with operators' concerns and the development of an interface for submission of the ASAD by operators, while at the same time terms of reference are being prepared for the hiring of external consultants to validate the top-down ASADs and develop the bottom-up model, with a view to subsequent reconciliation of the results.

Colombia

The regulatory authority has contracted for the preparation of an LRIC model for the fixed telephony service, with a network designed in the light of the specific characteristics of the country's territory. Preparation of the model marks the culmination of the regulatory process undertaken by Colombia to move from cost-based tariffs to the gradual deregulation of services where competition is well established.

In the 1990s, Colombia's regulatory authority undertook various studies to establish switched public telephony service tariffs, with the involvement of operators in a consultation process. When this process commenced in 1994, it was noted that the historical tariffs were not cost-aligned, and that various cross-subsidies existed between services (especially from long-distance (international and national) to local telephony) and between consumer groups. This situation gave rise to a tariff rebalancing process with an increase in local service tariffs and a reduction in the percentages of subsidies (abatements and surcharges vis-à-vis the base tariff) between consumer groups. In addition, access charges were determined based on historical costs, with a view to the subsequent alignment of access charges between operators. In 1997, a cost-based tariff methodology was implemented, combining price caps and rate of return, and assuming an actual return of 13 per cent. Costs were determined based on historical values and forecasts of the future investments required to satisfy demand. Cost caps were also determined according to company size (in Colombia there are different telephony service providers for the different localities).

In 2005, Colombia's regulatory authority hired an external consultancy firm to develop an LRIC model specifically for Colombia for the purpose of establishing the costs and then, using that as a basis, the tariffs of basic fixed telephony services.

Colombia's cost model defines the structure of the fixed telephony network and its components:

1) "Access module", comprising: "copper primary access segment", "copper overhead secondary segment", "dropline segment" (dropline cabinets), "fibre-optic access" and "fixed wireless access primary network distribution algorithm";
2) "Switch module";
3) "Trunk module"; and
4) "Network cost estimation module". This module is restricted to the calculation of costs once the information concerning the elements of the theoretical network designed have been entered.

Costa Rica

In reply to our request for information, the Administration of Costa Rica indicated in particular that telecommunications are subject to a State monopoly system headed by the Instituto Costarricense de Electricidad (ICE), which is responsible for satisfying demand for all services. Its regulations therefore contain no specific reference to a mandate for universal service, which we interpret as being implicit in the general characteristics and obligations of service provision.

According to Cost Rican legislation, tariffs are to be cost-based, and the prices of all services are regulated inasmuch as they are provided on a monopoly basis. The regulatory body is the Autoridad Reguladora de los Servicios Públicos (ARESEP), which receives all financial and accounting information from ICE. However, there is no specific accounting format for the submission of this information, and ARESEP and ICE have therefore agreed that ICE should prepare a cost accounting system.

ICE's costs are currently computed by business units, but for new services those units enter only additional costs into the accounts as an approximation of the incremental cost without including common costs. The cost-based tariffs are regulated based on historical costs and a rate of return on capital. Benchmarking is used only for price orientation for international services, whereas competition from callback-type services and network bypass made it necessary to rebalance domestic tariffs.

Chile

In this country, the principle of cost-based prices is fully instated and tariffs are based on the incremental cost of developing an efficient enterprise. Once they have been determined, tariffs are updated by inflation indices and are revised regularly on the basis of cost information submitted by operators, with subsequent review by the regulatory authority.

The regulatory framework provides that "an enterprise shall be considered as being efficient if it offers only services subject to tariff-setting, with the investment and operating costs of each service, including the capital costs, being determined in the efficient enterprise. The costs to be taken into consideration shall be limited to those that are essential for the corresponding efficient enterprise to provide the telecommunication services subject to tariff regulation, using available technology and maintaining the quality of service established for the said services".

The model efficient enterprise approach enables tariffs to be set in accordance with the costs of the most appropriate technologies available on the market at the time of such setting, although construction of the theoretical company is based on the operations of real, existing companies. The operational and cost information relating to the companies is used to establish the possible cost of an efficient enterprise.

The prices regulated by the Chile Administration are: subscriptions and prices for the metered local telephone service, access charges for fixed and mobile networks, services on the long-distance network provided by main operators to their competitors, and local network facilities and elements.

The Chile Administration has established a procedure for operators to submit tariff adjustments, involving a series of reviews and consultations up until a final decision is taken, as follows[6]:

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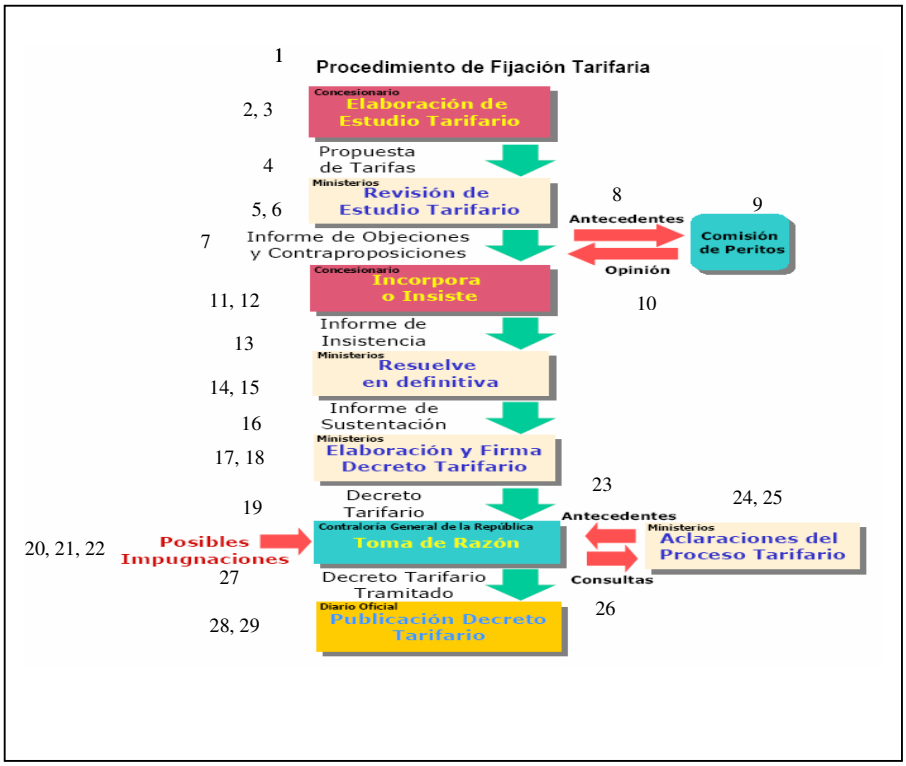
[6] Presentation by Subtel, Chile (Santiago, 2004).



1 Tariff-setting procedure
2 Licensee
3 Elaboration of tariff study
4 Tariff proposal
5 Ministries
6 Review of tariff study
7 Report on objections and counterproposals
8 Background
9 Committee of experts
10 Opinion
11 Licensee
12 Incorporates or insists
13 Report on insistence
14 Ministries
15 Final decision
16 Substantiating report
17 Ministries
18 Elaboration and signature of tariff decree
19 Tariff decree
20 Possible objections
21 Controller-General of the Republic
22 Constitutional review
23 Background
24 Ministries
25 Clarification of tariff process
26 Consultations
27 Processing of tariff decree
28 Official bulletin
29 Publication of tariff decree

For the purpose of establishing charges for interconnection (access) to fixed and mobile networks, an estimate is made of the investment required for expanding the networks, to which end the total long-run cost is determined, taking account of asset replenishment for the efficient enterprise and the average volume of service provided. The return on capital employed is calculated based on the risk-free rate plus the systematic risk and risk premium. Operating companies submit their calculations to the regulatory authority, whereupon the calculations are subjected to an expert review process.

Ecuador

Pursuant to Ecuador's regulatory framework, the regulator gives priority to agreements between parties for the establishment of the technical and economic bases for interconnection, but is required to intervene to arbitrate on interconnection contracts where the parties fail to agree.

Interconnection charges should be determined on the basis of LRICs and network unbundling in accordance with the model developed for the purpose by the regulator. The LRIC should take account of return on capital.

In order to determine the cost-based interconnection charges, the Administration of Ecuador applied one cost model for fixed and one for mobile telephony, known as Interoffice and Wicom, respectively. The first model starts out from the hybrid HPCM model, which combines the TSLRIC and TELRIC concepts and is a bottom-up approach, valuing inputs at their international price (Ecuador uses an exchange model based on dollarization of the economy and the exchange rate is similar to the United States dollar.

According to an official document submitted to CITEL by Ecuador, the Interoffice model costs the fixed network according to its main interconnection elements: switching, transmission and signalling. It uses the demand information (traffic and lines) and the georeferenced location of the switching centres (a data element for the model) and dimensions the capacity required to cover the demand from the switching centres and transmission links. The annual costs are calculated for each network element using annualization factors for the investment amounts determined. The annualization costs include the cost of capital, cost of operation and maintenance, and useful lifetime of the equipment used. The total costs are the result of adding together the switching, transmission and signalling costs.

The model used to calculate interconnection costs in the mobile network (Wicom) is also bottom-up and is a TELRIC model, into which the international prices of the network elements involved are loaded. The network elements taken into account by the model for a wireless network are those that enable connectivity of users with the exchange and between themselves, i.e. connection of the network customer's base station to a switch with adequate capacity (allowing for peak demand hours) and interconnection of that switch with other base stations and other switches in order to route the calls to their destinations. The model incorporates links for connection between the exchange and base stations with optimum capacity based on cost and distance, selecting the most appropriate technology in each case (fibre optic, microwave or satellite). The costs of each network element are annualized in the manner described for the Interoffice model.

The regulator assumed an ideal structure for the debt/equity ratio of the enterprises, namely 50:50. Based on that assumption, a per-minute price of 1.66 cents (USD) was determined for interconnection to the fixed network for a capital cost of 23.87 per cent and of 1.70 cents for a capital cost of 25.82 per cent, while for the mobile network the cost was determined as 11.31 cents for a capital cost of 25.82 per cent. The capital cost includes taxes on utilities.

The Administration of Ecuador has not imposed any obligations on service operators in regard to accounting and cost information or to any cost methodology for the presentation thereof. A contribution of 1 per cent of gross income exists for financing of the universal service obligation.

Like other administrations, the Ecuadorian regulator agrees on the usefulness of benchmarking in respect of tariffs and of other data pertaining to the TAL Region.

Mexico

Mexico's regulatory framework provides that tariffs should be cost-based. Interconnection should be based on free agreement between the parties, but where such agreement is lacking, resource may be had to arbitration by the regulator, which to that end will take into account the financial situation and forecasts of the operators in question.

To ensure submission of the appropriate information, it was decided that operators should present a cost accounting model in the form of a cost manual together with the corresponding accounting separation methodology. The manual defines the services, facilities and network elements, i.e. the services on fixed, mobile, long distance and other networks.

The ABC approach is used for cost allocation, for which purpose the corresponding cost groups, processes and activities, common and joint cost allocation approaches and characteristics and content of the accounting reports are established.

Nicaragua

Exercises were carried out involving application of ITU's COSITU model for the fixed and mobile (GSM) networks, focusing on tariffs for the former and call termination prices for the latter. The presentations may be found at http://www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/nicaragua-06/presentations/html.

For traditional services – local or urban, long-distance national or trunk and international calls – the exercise involved the alignment of tariffs on costs. The restrictions taken into account by the Nicaraguan Administration were that in a hypothetical rebalancing neither the fixed-service connection rates nor monthly subscriptions should increase (i.e. the only adjustment might be to the tariff for metered calls or calls billed according to their duration), and that there should be a contribution to finance the universal service obligation (USO) and a 2 per cent annual improvement in efficiency over a two-year transition period for the implementation of the tariff changes. The initial scenario for the exercise was an access deficit and a surplus in long-distance services (trunk and international) resulting in a cross-subsidy to the local service. In those exercises, the modification of interconnection rates was not considered and the effect thereof on the access deficit was therefore not incorporated. The COSITU model was run in two stages, one for each transition year, inputting, for each year, the traffic and forecast traffic, costs and efficiency gain. The access deficit fell in the first year and disappeared in the second as a result of the increase in the local service tariffs and reduction in the long-distance and international tariffs. The USO contribution was 1 per cent in the first period, increasing to 2 per cent in the second. With the rebalancing, the access deficit is eliminated and the tariffs are cost-orientated. In the case of termination on a GSM network, the tariffs should also fall to become aligned on costs.

Paraguay

The Administration of Paraguay indicates that the fixed-service tariffs were rebalanced based on LRICs. Tariffs for the basic service are currently regulated by means of a price cap system. For other competing services, the administration merely monitors the market conditions and thus the "reasonableness" of the tariffs in force.

There are no regulations on cost methodology and accounting information, and operators are required only to submit their accounting situations and balances annually. The costs include a contribution of 1 per cent of gross income as an "operating rate", of which 20 per cent goes towards funding the universal service obligation.

The Paraguayan Administration has not undertaken tariff benchmarking with other countries of the region, but considers that regional comparison would be useful.

Peru

The regulations in Peru uphold the principle of cost-based tariffs, although currently the submission of accounting information is not regulated by the oversight body (OSIPTEL) and meets only the criteria of the operators who for this purpose are required to submit their own cost studies, which should include "direct", "shared" and "common" costs. For this purpose, the main incumbent operator follows a bottom-up LRIC approach.

The regulations provide for the use of an efficient enterprise cost model based on LRIC, but in previous stages use is made of historical-cost data and secondly, as a reference source, to benchmarking and comparison with "best practices". The regulation of interconnection follows a similar approach, with OSIPTEL establishing *a priori* reference values, although agreement of the parties is expected at the outset.

The tariffs applicable to the basic service, which are subject to control, were rebalanced during the last decade and since then have been regulated by price caps and reviewed every three years. Contribution to universal service is 1 per cent of gross billing, and is paid into a specific fund that subsidizes such services.

In order to comply with the stages foreseen within the regulatory framework for ensuring that prices are cost-oriented, OSIPTEL has initiated a competitive procedure for the hiring of outside consultants to prepare a manual of accounting and accounts separation information for the *Empresa Telefónica del Perú* for subsequent submission by the operator. This will make it possible to determine the costs of the different services, those services subject to tariff regulation and those subject to free market competition (free prices). This information should be useful in determining tariffs and prices for interconnection.

Dominican Republic

The general mechanism applicable to telecommunication services in this country, including interconnection, is price freedom. Intervention by the regulatory authority is foreseen in order to determine prices in markets where competition is insufficient and, in the case of interconnection, where agreement between the parties is not reached within a reasonable period (60 days). The prices established by the regulator are to be based on LRICs.

Additional approaches in the study of long-run costs include regulating the calculation of the cost of capital according to the weighted average cost of own and third party capital (WACC). In order to establish the costs, the regulatory authority draws on sources of information other than that provided by the operators themselves, and valid tools for this purpose include benchmarking.

The tariffs set are revised every two years or following a period of no less than six months at the request of the parties (operators), while in each intervening period the value of the tariffs set is adjusted by price indexes.

The regulatory authority is currently analysing the future implementation of an LRIC model. For this purpose, and as a stage prior to construction of the information base, the telecommunication regulatory body *Instituto Dominicano de las Telecomunicaciones* (INDOTEL) recently initiated (Resolution 128/06) a public consultation process with a view to drawing up "Regulations for Separate Accounting".

The aforementioned regulations are to cover all telecommunication services: a) for fixed networks, fixed telephone installation and traffic; circuit lease, including fixed interconnection; value added services, Internet; b) for mobile telephony networks: activation, traffic, interconnection (mobile network termination), circuit lease; c) for public telephony service providers: traffic, calls to mobile; d) for cable TV providers: installation, local channel signal retransmission, and other unregulated activities.

Trinidad and Tobago

In compliance with the provisions of the 2001 Telecommunications Act, the Trinidad and Tobago Regulatory Authority (TATT) has initiated public consultation processes to establish specific regulations for the service tariffs (retail and wholesale) (2006) and interconnection tariffs (2004 and 2005) based on cost orientation principles.

The regulations foreseen for price regulation stress the need for price caps in markets not subject to competition (unchallenged) or for dominant operators in competitive markets, i.e. those that in principle have 40 per cent or more of the market for a given service.

For the purposes of cost-based regulation, TATT has foreseen the development of an information system complying with accounting separation principles and the assignment of common and shared costs between services.

Principles regarding interconnection are established based on ensuring competition, and, to that end, on transparency, non-discrimination and equal conditions between operators, with reciprocal prices. Dominant operators must have a reference interconnection offer (RIO).

In the short term, and until the ad hoc costing approach is established, TATT will be able to use benchmarking in order to establish interconnection prices.

Uruguay

The regulatory body, URSEC, does not control the prices of telecommunication services for end consumers, but does control interconnection prices for which reference values exist. Agreements between operators are free, and URSEC intervenes only when one or both parties appeal. The State enterprise ANTEL has the monopoly for the provision of fixed telephony, data and Internet and establishes its own prices. The mobile telephony market operates on a competitive basis, with three operators, including ANTEL itself. The cable TV companies do not provide Internet, telephone or other telecommunication services. The regulator does not require operators to provide any kind of information on costs, and there are therefore no regulations on accounting information. Nevertheless, the regulator does intend to carry out an LRIC study for the future establishment of new interconnection tariffs (network access and the lease of essential facilities).

2.3 Common elements in the study of costs and use of models in the region

The study of costs in order to set interconnection tariffs and prices is taken into account in the regulatory frameworks of the great majority of countries in the TAL region. In the study, some regulatory authorities have made progress in the development of accounting manuals that foresee the presentation of information regarding the fixed telephony operators with accounting separation between services, the definition of network elements and the assignment of costs based on both the FDC and ABC approaches.

Very few administrations have thus far implemented cost models, although several have programmed their future development. In virtually all cases, stress is placed on the geographical characteristics and local design of networks, making it necessary to tailor the manuals of accounts and models to the situation of each country. In some cases, for example Ecuador, models taken from elsewhere have been adapted. Nicaragua ran ITU's COSITU model separately for fixed and mobile networks.

By using the models, administrations are seeking to identify the incremental costs of fixed telephony, and only in some cases those of mobile telephony too, and even here the focus is only on determining access prices (interconnection).

The accounts manuals and networks modelled for fixed telephony services are developed based on a traditional, circuit-switched network configuration, known as the "Public Switched Telephone Network" (PSTN) and copper access outside plant, although other access technologies are also being considered.

Insofar as in most cases these studies are under development, the practical examples of cost studies and tariff calculation are based on the study of the historical costs of operators (established or incumbent operators for the most part) and international benchmarking.

In addition, since the manuals and models in question are in the process of implementation, the only source for the collection of information is established operators. In some cases, these have presented cost calculation models produced by outside consultants to back up their submissions to the regulatory bodies. Furthermore, in most countries external consultants are hired to develop the manuals and future cost models, and are also seen as being required for their subsequent implementation (data collection, evaluation and inputting, discussion of results, consistency tests, etc.).

In all events, the obtaining of objective cost data in order to determine tariffs and prices is the reasoning behind the collection of appropriate data, submitted in formats that allow the proper separation of accounts between services and the subsequent correct inputting of data into the models, taking into account the specific characteristics of the networks of each region and the basic approach of using top-down and scorched-node models based on the existing networks.

Most of the administrations consider that a transition period is required between the time of calculation of the efficient case and that of the adaptation of the real networks to that *desideratum* identified as an objective. This transition may not always be explicitly foreseen in regulations, but it comes out anyway as part of the negotiation process. The transition phase results from identifying the periods required to recover investments made in existing networks and the possible use of technologies other than those considered optimum at the time of the calculation.

In this regard, the models are to be seen as a significant, but not the only, consideration when it comes to determining prices and tariffs, even though most of the regulations specifically provide that the prices of interconnection to the RSTP shall be based on LRICs.

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CHAPTER III

Bases for regulatory body accounting information

3.1 Scope

Having **complete and verifiable** (subject to audit) **accounting information** on the economic performance of services (costs and revenue), particularly those that are subject to price control, is a reliable point of departure for the regulator's decisions regarding pricing policy, as well as the basis for the possible construction of a cost model.

Earlier we gave a general description of the properties, purposes and scope of such information, drawing attention to the need for application of the principle of "**accounting separation**". We also pointed out and clarified the general principles to be satisfied by regulatory accounting, namely "relevance", "reliability", "comparability", "materiality" (which implies "being subject to audit") and "integrity" (see §1.9 "Regulatory accounting" in Chapter I of this report).

A number of the region's administrations are moving ahead with the implementation of specific formats for the submission of such information (regulatory accounting with separation of accounts by service). The point of departure for this are the records that are drawn up by service operators, i.e. the statutory accounting records which have by law to be sent to directors, shareholders and interested third parties such as banks, stock exchanges, etc. Those statutory accounts are subsequently recalculated to adapt them to the characteristics required for regulatory accounting purposes. In almost all cases, this calls for the proper separation of costs and revenue among the services concerned, there being only a handful of exceptions in which we find companies subject to price control that are the providers of a single service (de facto accounting separation).

Further to the proper separation of costs, the next step is to correctly classify the cost components so as to be in a position to correct the historical values drawn from the accounting records by adjusting them to reflect the effects of inflation, and to determine the efficiency factors.

By updating the historical accounting data it is possible to arrive at current or actual costs, from which it is then possible to obtain the forward-looking cost values for the construction of top-down models.

It is for this reason that the data format must be set up in such a way as to provide specific details of the different activities or centres of activity in which are to be grouped the costs and the approaches for assigning the shared costs (i.e. those incurred in the production of more than one service) and the common costs (i.e. those corresponding to the company's general business and involving all of the services provided).

In preparing the accounting information to be provided by operators, it is essential to have an adequate **definition of those services whose tariffs are subject to regulatory control**, with all of the other services whose specific costs are of neither current nor potential interest to the regulator being grouped under a single heading.

In consideration of a higher phase of effective competition, it will be appropriate to take a restrictive approach to the exclusion of services from the accounting separation regime, given that their data will be necessary for monitoring competition. Indeed, the major incumbent operators of the main services subject to regulation, such as local fixed telephony, long-distance, network access, leasing of interconnection facilities, etc., tend in turn to participate in other free-price markets, where the administration focuses its attention on safeguarding competition. And in such cases it can be useful to have information that enables one to prevent anti-competitive behaviour, such as cross-subsidies between services and the systematic sale of services below cost for purposes of market plundering, among other practices.

In defining the services that are concerned by accounting separation, it is also necessary to establish, for those that are subject to price regulation, **which companies are to provide the information**. In principle, we may find markets in the conventional form with a monopolistic company, or a company having dominant power, in their service area, as is the case, for example, of local fixed telephony services and possibly also long-distance telephony. We may find markets in which there is more than one company with market power, and such companies have to be approached with a request for information. One example of this segment may be mobile telephony, where there is a limited number of operators. Although such markets tend to be characterized by a free-price regime, which would obviate the need for tariff-based regulator intervention, one cannot get away from the need for determining charges for interconnection to those networks (particularly where fixed-to-mobile calls are concerned).

A special case that will need to be resolved depending on whether the regulator needs to obtain cost information for those services is that of markets in which there is sufficient competition and no operator or group of operators exhibiting market power. For example, in various countries of the region Internet access services perform in a highly competitive manner, and regulators tend not to intervene either on the pricing front or by seeking to regulate VoIP services. On the other hand, some of the region's regulators intervene in and require accounting information on cable television markets, even where they are competitive, whether on account of the existence of various providers of a signal by cable, or of others providing a signal direct to the home via satellite. The cable television service and its alternatives are liable to attract increasing regulator interest owing to the development of television signal distribution services using fixed telephony network cabling. Some regulators, moreover, in addition to setting prices for leasing of the subscriber loop (fixed telephony) are looking into the regulation of prices for the leasing of cable networks for the distribution of television signals.

In short, for these markets it will be the scope of each regulatory framework and the degree to which intervention is necessary in order to safeguard competition that will determine the extent to which it is necessary to include such companies providing services other than conventional telephony within the group of companies that are required to furnish information on, among other things, costs, assets, investments and prices.

3.2 Content

The **information and accounting separation manual** is drawn up on the basis of the historical data that regulated operators have to submit, according to the scope of the prevailing regulatory framework, which will include as a minimum the dominant fixed telephony operators. The manual must also define those services that are subject to accounting separation, grouping under a separate heading ("others") all of those services that are not of interest to the regulator, either now or in the future. This does not, however, eliminate the need to determine, for that group of other services, appropriate terms for the correct assignment of costs, in order to prevent it from becoming impossible to monitor proper assignment in those services that are subject to control with costs, revenues and assets whose recorded values are correctly separated and differentiated.

The services that are generally included in the existing manuals on **regulatory accounting with account separation**, or in those currently being prepared by the countries of the region, are:

a) fixed local telephony service,

b) local mobile telephony,

c) national long-distance service (not all of the countries have differentiated local service areas and not all of them separate their domestic telephony services into local and national long-distance services, this being mainly dependent on the size of their territory, as well as other country-specific features),

d) international long-distance service,

e) public telephony services (public telephone facilities),

f) switched termination on fixed and mobile networks,

g) local transit, long-distance transit (where the local service does not cover the entire country),

h) leasing of circuits, subscriber loop and other facilities, and co-location,

i) signalling,

j) value-added services.

A number of administrations also include other services within the scope of accounting separation, such as:

k) trunking (fleet radiocommunication),

l) Internet provision,

m) cable television distribution.

In addition to the above, administrations may sometimes propose a more detailed structure within the definition of each service, for example distinguishing between installation (connection) and fixed-fixed and fixed-mobile calls in local telephony. The pricing concepts may also come in for subdivision (for example, the tariff for the local open service may be broken down into: connection charge, monthly subscription for line maintenance, price per call to a fixed/mobile number, etc., instead of a single subscription with a flat-rate tariff and no connection charge, etc.).

The next step is to categorize the **types of cost**, namely:

1) **directly assignable**: those that can be easily identified with the provision of a particular service (and which would not exist if the provision of that service were to be withdrawn while maintaining all the others);

2) **shared costs**: those that are incurred in the provision of more than one service;

3) **common costs**: those having to do with the company as a whole (general management, financial administration, etc.) and that do not relate to any service or group of services in particular.

The operator must provide information on the costs, assets and revenues by service and by activity, making it necessary to define the activities and the approaches for assigning costs, both those that are shared by activities within the different services and those that are common.

The ABC approach is the one that enjoys the greatest support within the region, although there are also cases in which administrations have thus far limited themselves to requesting the assignment of costs by service with full assignment, i.e. the FDC approach, but without defining activities. This is because the FDC approach is easier to apply, while the definition of activities for the purposes of cost assignment ensures that that assignment is properly effected.

These approaches called for the **definition of cost drivers** for the different services.

We will thus have, as our point of departure, the costs of the resources to be taken into account: staff, materials, assets (outside plant, switching and transmission equipment, installations, furniture, vehicles, software, premises, etc.), payments to operators and other items of general accounting data. These costs will then be distributed by activity and subsequently assigned to each service, this being in the proportions dictated by the cost drivers in the case of shared and common costs.

Activities to be taken into account

a) Network deployment and operations,

b) Customer service,

c) General activities not attributable to services or groups of services.

Group (a) includes installations, customer connections, operation and maintenance. In the case of a conventional fixed network, the activities may be opened up more in the areas of access/local loop (taking into account installation, connection, operation and maintenance), switching (with similar opening up), transmission and signalling. Other networks may present similar activities, although they may require other types of opening up – for example, there is no local loop in mobile telephony, but there are sites, cells and wireless access (antennas). All in all, technological evolution may represent a permanent force within the different services for the proper opening up of activities.

In group (b) we find customer administration and marketing activities (customer services, invoicing and collection, etc.).

In group (c) are the general administrative tasks that are not related to specific services, as well as the general corporate tasks (board of directors, etc.).

The next step is to assign the costs of activities to the different services, beginning with those that correspond to a single service and are therefore directly assignable. By contrast, for the shared and common costs, the costs and the costs of assets (depreciation) will be assigned among services by establishing objective and reasonable cost drivers, as far as possible based on physical factors such as the use of each type of service (traffic or usage time, etc.), hours dedicated to each service, etc. To that end, it is recommended that these measurement yardsticks be checked against surveys, traffic information, etc. It is more difficult to determine these physical drivers in the case of common costs, since, other than in the case of staff hours one is less likely to come up with objective and unambiguous trends. In such situations, as we saw in Chapter 1, the tendency is to have recourse to criteria relating to participation in the total cost or total revenue, there being in the latter case at least no direct recurrence, other than where the result of the costs will serve as the basis for the future determination of prices by the regulator.

The effects of this circularity, which results from assigning common costs for the participation of each service in revenue, may diminish through a reduced sequence of iterations in the event of a change in tariffs further to the application of accounting separation. Another alternative that has been pursued by a number of regulators in the region is benchmarking to determine the proportional distribution of administrative and other common expenses. Similarly, some of the region's regulators have provided that an initial determination of the cost assignment approaches shall remain in the hands of the incumbent operators, subject to their corresponding justification and subsequent discussion with the regulator.

Regulators are likewise able to establish asset depreciation criteria in order to correct the accounting values. The historical values of the assets may in turn be corrected by their replacement cost for their transition to current values.

Following the recommendations of the TAL model and those produced by international work in the field, and in line with experience in the region, the cost of capital is calculated using the weighted average cost of capital (WACC) method, i.e. the average weighted cost of the capital itself and of third parties (debt), introducing the market rate of interest for the debt (some administrations adopt the book value of the cost of the debt) and the market's own rate of return (risk-free market rate plus the country-risk rate), corrected by the Beta factor for variability of communication company share prices on the stock exchange.

Consideration should, however, be given to the setting of a cap[7] on this rate of return on equity to prevent it from rising enormously in the event of an abnormal state of extreme volatility in the country-risk rate, as occurred in some countries of the region at the end of the last decade and beginning of the present one as a result of major financial crises. Indeed, in such situations the acceptable theoretical rate of return covered by the country risk would rise to unthinkable levels, placing the administration, in other words the regulator, in an ambivalent and jeopardizing situation. To comply with the regulations it would have to raise tariffs, which to some extent remain tied to the volatility of the financial market (in proportion to the cost of the equity over the total cost of each service). On the other hand, complying with this mandate without setting any limits may prove politically impracticable.

For administrations in times of crisis it is difficult to correct tariffs by means of an exaggerated increase in the risk rate. In all events, consideration could be given to long-term risk rates by averaging values over more extensive periods so that the aim of covering the assumed risk, which is theoretically solid, remains equally feasible over the long term.

The calculation of the cost of capital will include the impact of taxes levied on the equity.

For their part, **revenues** are generally directly assignable to services, although there can be cases of tied sales or sale packages of more than one service for which assignment approaches also have to be established, probably based on the operator's reasoning, but with a floor price for price-regulated services that is given by their respective costs.

In the case of **transfer costs and revenues**, i.e. services sold within the company itself between different production lines, the costs and revenues are imputed with the corresponding assignment as if they had been sold to/purchased by another provider at market prices.

The information on costs, assets, revenues and investments attributable to each service is then set forth in **comprehensive spreadsheets showing the balance data** (revenues – costs) and **investments and assets status** (net depreciation values and current investments) **for each service**.

The final step is to submit the **information consistency reports** showing the values set forth in the **balance sheets by service and other regulatory information** (assets, investments) **to be consistent with the common (statutory) balance sheets**, accompanied by the operator's explanations for any discrepancies.

The **information** submitted by the operator must be duly **audited** by an external auditor, in a manner that is independent from any audit exercise that may be carried out at any time by the regulator. The information may, for reasons deemed appropriate by agreement between operators and the regulatory body, be classified as confidential, although not of course in regard to the regulator.

3.3 Information-gathering

The **request for regulatory information**, based on a specific structure or format, stems from the a priori recognition of the phenomenon of information asymmetry, which has to do (see Chapter I) not only with the accounting data themselves but also with the need for better knowledge on the part of the operator of its critical business variables.

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[7] This consideration stems from observation of the experience of countries in the region that have suffered abrupt transitory increases in the risk rate. Papers relating to calculation of the average cost of capital have thus far not taken account of this cyclical factor.

This being the case, when it comes to determining the most effective means of drawing up the regulatory accounts (including separated accounts by service), it is appropriate to use the **consultation or "prior consultation" process**, i.e. the seeking of an opinion to be taken into account prior to issuance of the formal request for information based on the format ultimately selected. Each administration must, moreover, define the stages and scope of the interactive process with the interested parties in the period leading up to the final decision. As a general rule, it needs to be agreed that a flexible approach will be conducive to ensuring that the information provided is of the greatest possible use.

Most of the region's administrations obtain accounting data from operators, at least from the fixed-telephony incumbents, although for the most part only on the basis of historical data and not necessarily with adequate accounting separation between services. This means that, when introducing a specific format based on FDC or, more probably, ABC approaches for the purpose of securing correct accounting separation, those consultation procedures should be set up in such a way as to ensure consistency with the reforms implemented in the area of information submission.

Before specifying the characteristics or format it intends to introduce for the gathering of data, it is important that each administration define the scope of its use, i.e. whether it is to be used for: a) supporting the review of service tariffs with regulated prices; b) the subsequent derivation of current or actual cost calculations; c) the inputting of a future construction of incremental cost models; d) regulating competition (avoiding cross-subsidies and below-cost sales, among other potentially anti-competitive practices); and e) any combination of these or other objectives.

A permanent institutional consultative link with operators, aimed at dispelling uncertainties and avoiding any problems, is a valuable tool to which some of the region's administrations have had recourse during this process.

Once the process of proposing, discussing and reviewing the format has been completed, it is sent out to concerned operators with a request for reply, after which the information received is processed and the **results** obtained. These must then be **reviewed** to determine their consistency and the degree to which they are close to or distant from the existing regulated price levels, with a period for adaptation being specified, as necessary, to improve their approximation to costs, this being without prejudice to moving ahead in parallel with the possible obtaining of corrected actual cost values from the historical costs, and of forward-looking costs from the actual costs.

As we shall be seeing later, any change in the cost methodology used, in principle involving the move from historical to current or actual costs, then from these to forward-looking costs, and finally the application of LRIC-based models, may require transitional steps for their implementation.

3.4 Conclusions

Progress is being made within the region on the gathering of information for separated cost account manuals and other results by type of service. These manuals are fully compatible with the general principles of the TAL model for international termination on telephony networks, although their objections are broader.

In most cases it is understood that the historical accounting values have to be adapted in order to obtain current values under the best possible conditions of operative efficiency, and although such updating is not yet taking place in all administrations, it is earmarked as a task to be undertaken in the near future.

A smaller number of administrations is preparing to move in the short term towards the construction of top-down cost models with a view to the implementation of LRIC-based prices.

The cost manuals currently being developed adopt the ABC approach.

These activities are generally foreseen within the context of the existing technologies for current networks. However, networks are facing possible migration to new designs, solutions and types of service, whether on account of fixed-mobile convergence, the provision of VoIP services and other IP solutions or the breaking down of distance-separation parameters ("tromboning", "bypass"), among other phenomena, the combined effects of which are tending to result in the obsolescence of certain separations between services that are provided alternatively or jointly using the same type of technology or, as the case may be, with characteristics and qualities of a different nature.

For this reason, to the natural transition involved in any process of adjusting prices to costs, where methods are introduced to correct the initial calculations (these having possibly been based solely on historical and fully assigned costs without detailed approaches for accounting separation), will be added that technological change factor as an additional phenomenon to be taken into account in the process of transition – a process which in itself calls for negotiation between the parties involved – regulator, operators and customers/users.

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CHAPTER IV

Status of telecommunication price regulation in the TAL region

4.1 General overview

Virtually all of the countries of the TAL region are moving towards telecommunication service price regulation based on cost orientation in major competing service segments, particularly mobile telephony, in which prices are unregulated.

The prices for access through interconnection to the majority of networks are regulated by means of a cost methodology or some other approach imposed by the regulatory authority, while the main product whose final price is set by the authority is local fixed telephony (the price of which normally comprises a subscription and a variable element depending on usage time), in addition to which the authority also sets the tariff for fixed public telephony.

Cost orientation for the purposes of price regulation focuses on local fixed telephony, access (termination) for international calls and interconnection to the basic fixed network (public switched telephone network or PSTN), although there are also cases within the region of regulated prices for access to mobile networks and other services.

Where tariff regulation is concerned, the countries of the region generally seek to follow the recommendations of ITU and CITEL, as well as the thrust of international consensus, as they work towards the achievement of balanced levels among the various services, avoiding, to the extent possible, cross-subsidies to local telephony (the most common trend prior to the 1990s) and anti-competitive practices in liberalized markets.

However, this general objective to achieve balanced levels in terms of regulated tariffs is not being fully met on account of certain pockets of internal resistance to such price movements and of inflationary pressures which tend to erode the values over time, given the varying levels of vigour with which they are updated.

The strong competition in international services, in many cases preceded or accompanied by the indirect pressure exerted by call-back and bypass services and, more recently, the VoIP alternatives adopted by Internet users, has accelerated the downward adjustment of prices in the international call market and international communications in general.

Several countries have developed, or are on the way towards implementing, cost models for their basic fixed telephony networks. In some cases, attempts are also being made to bring tariff models to bear on mobile networks, and mention should be made, likewise by way of an exception, of the adoption of "packetized" models for calculating the incremental costs of their fixed and mobile networks. We have received no information regarding the application of models for Internet or IP-based networks.

This trend in terms of cost-oriented price policies is the subject of permanent and ongoing negotiation between providers and regulators in regard to interconnection prices and the tariffs charged to the public for basic services. To this situation can be added the possible use of cost monitoring with a view to establishing subsidies for services provided pursuant to the universal service obligation (USO), although in the cases identified (and thus far analysed) USO either forms part of the incumbent's general obligations or it has been auctioned at the lowest possible price, resulting in the use of cost models for such cases being postponed or set aside. Nor should it be forgotten that where there is an operator contribution to USO, this will form part of the cost of the services and that the resulting impact has to be included in the calculation of the final tariffs (prices).

The recommendations of the TAL model have been taken into account in the cost models it is intended to implement within the region and are compatible with the principles on which ITU's COSITU model is based, which means that administrations wishing to move ahead with the implementation of COSITU should not encounter regulatory obstacles of a regional nature.

Any of those administrations that have made headway in the analysis of costs on the basis of their own model will tell you that network deployment has to take account of each country's specific features, whether in terms of the considerable topographic variety that exists between and within nations, or of the differences in regard to density (penetration) and consumption capacity (effective demand). There can thus be no question of adopting an "off the shelf" or "one size fits all" model, but rather a "proxy" of a "tailor-made" product whose ability to adapt to both the local specificities and evolving context will be a key factor in its successful implementation.

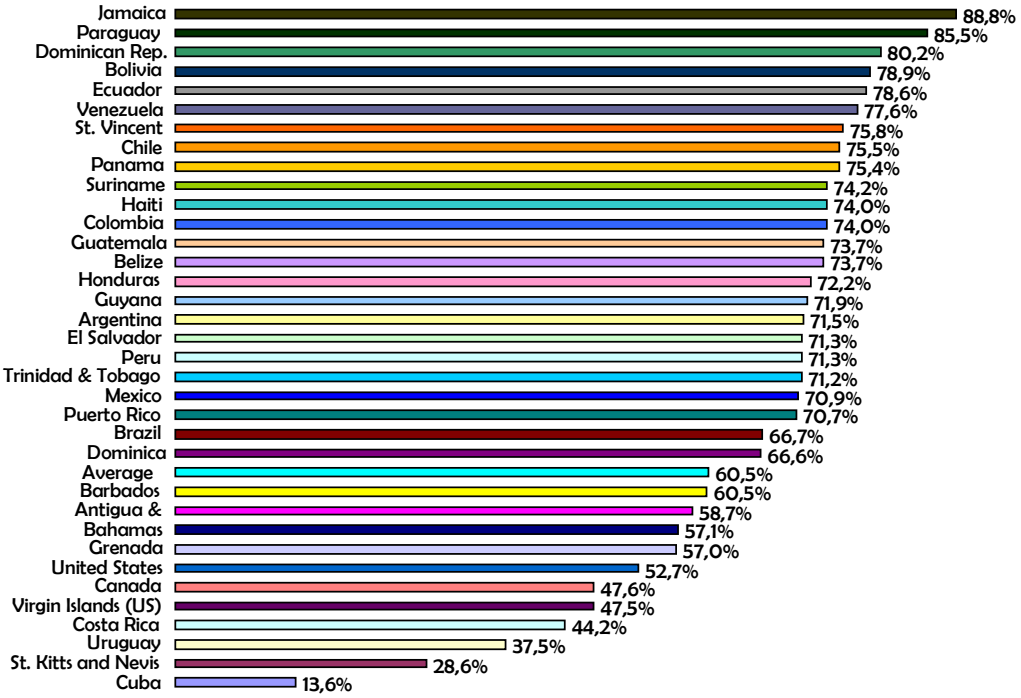
In this regard, the tendency most commonly seen in the TAL region is to apply – in those cases where a cost-modelling methodology is adopted for calculating regulated prices – specific models which in many cases have been developed by administrations themselves with the assistance of external consultants. Countries generally assume their specific features to be such that their network costs can only be reflected by specially-tailored models. It therefore goes without saying that only general models with flexible features are suitable for adoption by local administrations.

In addition to operators' historical costs, a further key factor when conducting regulatory assessments in the countries of the region is the use of benchmarking, particularly when it comes to determining prices for interconnection to fixed and mobile networks. Indeed, this is so much so that in some cases this resource is provided for in the regulatory framework as a transitional tool.

At the same time as we are witnessing a strong trend within the region in terms of the implementation of cost models, or at least cost studies, relating to fixed and, to a lesser extent, mobile networks, we are also seeing the extensive (although not full) opening up to competition, which is expected to bring about flexibility in consumer tariff policies, especially with the development of new networks lending viability to the offer of new alternatives for provision of the various services.

Certainly the first and most obvious case of the aforementioned was that of mobile telephony, which, following an initial period during which it served as a complement to the conventional fixed service, has moved on to become a replacement for fixed telephony, to the point where in some countries it has demolished the demand for public telephony and is now encroaching on the market for fixed telephony in the home. Thus it is that a majority of the countries in the region now have a higher level of mobile penetration than fixed (see figure).

Mobile subscribers as a proportion of total telephony
Data as at 12/2005



Source: own elaboration using data from "Telecom Indicators", ITU (2005)

In various countries, this process may have been facilitated by mobile service tariff flexibility, as seen in the widespread rollout of prepaid options tailored to the consumption capacity of the medium and medium-low income sectors, assessed in terms of purchasing power, as well as in the absence of price restrictions, which enables the design of a wide range of offers for different categories of consumer, whereas in the fixed sector it is hard to find such tariff flexibility, to a large extent on account of the regulatory complexity of applying price baskets.

Mobile telephony has likewise found fertile ground in those countries which have seen little in the way of fixed telephony deployment (as measured by penetration), there being a few significant examples of this within the region although the situation is not widespread. In the most advanced countries, number portability and the introduction of the fixed-mobile service have served to move things in the same direction. Mexico recently decided to introduce fixed and mobile portability under a system known as ACQ (All Call Query). The only previous case of number portability in Latin America is that of Puerto Rico.

At the same time, behind mobile telephony, and as is the case in more highly developed economies, other services have also been competing with the traditional telephony market – for example, services providing expanded bandwidth for Internet access, where incumbent operator ADSL services are in turn already experiencing competition from cable television and wireless distribution services. In a further development, the network unbundling obligation is in some countries enabling operators other than the incumbent to provide competitive Internet services over their own ADSL offering.

The arrival of the new alternatives, with mobile services taking pride of place at the regional level, has thus been indirectly easing the demands for tariff regulation vis-à-vis consumers, although the debate in that regard is ongoing, as it is too in regard to interconnection rates.

At all events, interconnection in and of itself, for all its importance as a facilitator of competition, does not currently constitute the crux of the competition issue or of the price debate, inasmuch as it represents but a small part of operator revenue, although this is also due in part to the fact that some countries use systems of the "bill and keep" type, which do not make for transparency in regard to the true dimension of the economic phenomenon that is interconnection.

4.2 Main common approaches

1) No administration will deny the need to achieve regulated values in services where there is insufficient competition with cost-oriented tariffs, including, where necessary, a prior process of tariff rebalancing, which may be in the course of implementation or incomplete, etc.

In general, the aim is to reduce or eliminate the access deficit, which, if it persists, has to be incorporated in the tariffs for the various services provided over that network.

2) Optimum cost orientation based on the principle of cost causality tends towards the application of LRICs, with the greatest possible allocation of common costs which should not be discarded from the total cost of the service, and with the assignment of shared and common costs on the basis of ABC or, failing that, FDC approaches. An almost inevitable stage in achieving incremental values is that of current costs, i.e. historical costs that have been corrected to bring them into line with market values. The debate between administrations and incumbent operators, which have over the years invested in their networks and need to see a return on those investments within the context of economies that have yet to achieve the dynamism of those in the developed world, forms part of the tensions that exist in regard to the time-frames for the full application of LRIC.

At the same time, it needs to be noted that the new wave of VoIP applications, and hence of softswitching on all types of network (fixed or mobile voice), has to contend with new standards in regard both to quality of service and to costs. This point, i.e. the impact of technological change on the regulations, forms a significant part of the debate.

The manuals of accounts that have been developed and cost models that have either been implemented or are on track for future implementation are based on networks that were designed around the concept of circuit switching, the prevailing technology throughout the last century, whereas the new millennium is seeing the development of next-generation networks (NGN) based on packet switching.

3) The proper orientation of prices to costs also calls for the elimination of anti-competitive cross-subsidies, with the opening up to free markets being another of the great waves that are sweeping the continent.

The only constraint that is generally accepted has to do with subsidizing of the universal service where the obligation to provide it does not form part of the incumbent operator's specific terms of reference or when the corresponding subsidy does not come from the government's budgetary revenues.[8] From now on, however, the debate on the shape and scope of universal service in the region will have to look very closely at the changes that are occurring in regard to technologies and services, inasmuch as the new alternatives may well cease to form part of the incumbent operator's obligations.

Administrations should avoid barriers to competition and remove them wherever they exist. In this regard, the most intense debate focuses on the price of interconnection to existing networks and, more recently, the cost of access to mobile networks. However, where the expansion of competition is concerned the discussion could, in some countries, turn towards the question of determining the scope of mutual compensation within more open free-negotiation frameworks that would not exclude alternatives of the "bill and keep" type.

4) The first step for the regulator wishing to orient prices towards costs is to construct a **regulatory accounting** system, in which regard almost all administrations have been seeking abundant information, although not many of them have made headway in the design of specific formats meeting the basic conditions that need to be satisfied prior to the submission of data.

Some administrations have for this reason (given the difficulties inherent in information asymmetry) tended towards the construction of a model of the "black box" type, which enables estimation of the results (service costs) without relying on the goodwill of the operator(s) for preparing the information base (see § 2.2 "Selected cases" in Chapter 2). In any case, this approach is liable to throw up some difficulties of its own when it comes to achieving a reasonable rapport between the costs incurred by providers and the LRICs in the models.

5) A number of administrations, for example Colombia and Brazil, are currently engaged in the construction of cost models, while Chile is comparing operator costs with respect to the efficient company model. Similarly, Brazil's regulatory framework foresees the implementation of a cost model for mobile networks. For its part, Ecuador has calculated incremental costs for both types of network based on the application of external models (HPCM and Wicom, respectively), while Nicaragua has conducted exercises for fixed and mobile networks using ITU's COSITU model.

In all cases, administrations acknowledge the considerable local differences that exist in each country and within each country's regions on account of their differing geographic (topography), social (population density, isolated areas, etc.) and economic (varying income levels and hence degrees of purchasing power) structures.

It is a significant fact that the Federal Communications Commission (FCC), the regulatory body for the United States, a highly developed country, acknowledges the existence of major differences between regions in terms of topography and population density and accordingly sets differing prices for use of the local loop in different regions. It is to be noted that the submission of local-loop price data based on incremental costs points to a high level of correlation with the population density in that country's different states.

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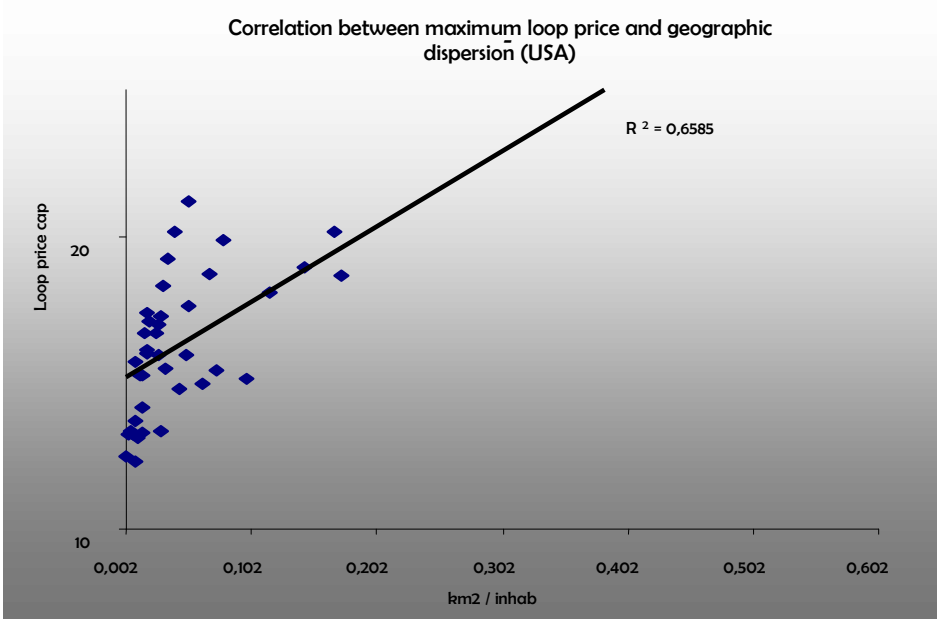
[8] There are cases of countries in the region (e.g. Chile and Peru) which separate the provision of basic services from the universal service obligation, whose provision forms the subject of least-cost bidding in the market, subsidized where necessary with resources from general income. However, the majority of administrations employ a system whereby all providers contribute to a universal service fund.



Source: own elaboration using FCC data (2003)

This comparison bears out the need for cost models to take account of regional specificities, thereby endorsing the position of the administrations in the TAL region.

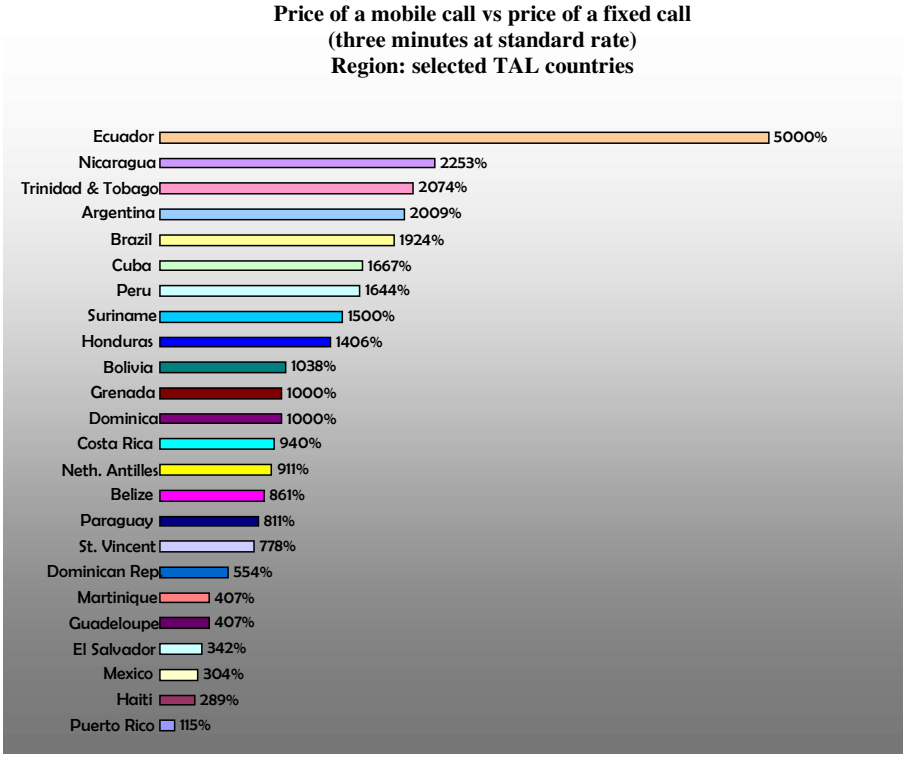
6) Although regulators in most cases establish reference interconnection tariff levels, the almost universally-accepted principle is to allow for free agreement between the parties, with the possibility of recourse to the regulator, with the courts having the final say in cases where the parties are unable to accept the outcome of such arbitration. This practice has been making it possible to reduce the number of conflicts of interest, with problems being resolved in one way or another, such that the most recent trend seems to have been towards regulatory activity characterized by "observation" rather than direct intervention, whereas in the previous decade conflicts between incumbent and new entrant operators, both fixed and mobile, were one of the hottest topics in the region.

7) During the period of adaptation to competition and of studies aimed at achieving cost-orientation, the main point of reference has been benchmarking, a useful tool for regulators that is based on:

- *Objectivity*: does not depend on the willingness of one of the parties involved but on correctly compiled data.
- *Ease of access to information*: market-value data, however determined, are readily available from sources that include the Internet, ITU, etc.

- *Low cost of elaboration*: the compilation task is both simple and accessible.
- *Flexibility*: specific application features may be introduced through the assimilation of exchange parities, adjusting the exchange rate levels by means of the purchasing power parity exchange rate and discarding countries with different regulatory models and highly differing economic structures, etc.

On the other hand, the region is characterized by a widely differing range of basic service and mobile service tariff levels (see table, ITU data, 12/2005), taken as a relevant case in terms of relative weight in the total volume of services.



Source: own elaboration on the basis of "Telecom Indicators", ITU (December 2005)

It is clear from the above that there is still a long way to go before achieving a certain level of harmonization in the implementation of cost-oriented price policies in the region, even taking into account the above-mentioned differences in network characteristics and environmental factors and hence in the costs associated with the different services in each country.

4.3 Conclusions in regard to future challenges

While it is true that administrations feel the need to improve their knowledge of basic communication service costs, particularly in those markets where there is insufficient competition, including network interconnection, their efforts in that direction run up not only against the difficulties that are inherent in cost calculation (whether by means of models or by other means), but also against the differences that exist between the theoretical and practical spheres, to which has to be added the pace of technological and market changes.

With regard to the gap between theory and practice, the OECD document "Access Pricing in Telecommunications" (Paris, 2004) points out that "Economic theory is clearly a primary input into the decision making processes of policy makers and regulators. But […] economic theory cannot always be perfectly reconciled with practice. […] There are many reasons why theory and practice may diverge".

The above-mentioned document indicates that models, by making certain assumptions, simplify the real world and that the aspects of reality may differ for numerous reasons including the following:

1) information asymmetry;
2) assumptions regarding the company and regulator that do not correspond to reality on account, for example, of political pressures, negotiations, etc.;
3) economic theory tends to ignore certain costs that are relevant in practice, such as those relating to information-gathering, the submission of that information in the required form, implementation of cost models, etc.;
4) economic theory does not take account of the time-frames that may be involved in implementing decisions that may in some cases be the subject of dispute and even involve the intervention of the courts, making it sometimes more practical to adopt alternative and more expeditious approaches;
5) a theoretical framework capable of capturing the complex and heterogeneous set of factors involved in the process may perhaps not yet exist.

This gap between theory and practice is widening in the case of cost models for telecommunication networks on account of technological evolution. In principle, the current telecommunication environment, which can be described as *evolving*, is one in which different networks and different applications co-exist and compete, with mobile telephony developing no longer as a complement to but rather as a replacement for conventional fixed telephony as its usage extends to fixed applications for fixed/mobile convergence, as well as new broadband and VoIP services which are together attacking the conventional voice market through the provision of Internet services and, potentially (depending on a number of regulatory factors), cable television.

For their part, fixed networks are introducing new broadband services over xDSL, while mobile networks are moving towards the provision of other services and applications requiring a high bandwidth (messaging, online games, mobile Internet and other Internet adaptations, etc.), with a view to the possible future introduction of latest-generation mobile networks using an even higher bandwidth, known as UMTS (universal mobile telecommunications system).

This evolutionary scenario may continue with these basic characteristics for some time to come, but will probably then settle into a landscape either of broadband networks based on IP solutions, or of multiple-use wireless networks. In the first scenario – networks based on IP solutions – the existing and new networks will transform and migrate towards packet switching, with all wireless solutions connecting to IP base stations, whereupon WiFi (wireless fidelity), WiMax (worldwide

interoperability for microwave access) and cellular systems, among others, will thus become IP terminals. In this regard, there are those who take the view that NGNs characterized by packet switching with IP-type protocols will in future become the alternative towards which not only fixed networks but also mobile networks will migrate. In the second scenario, mobile broadband networks constitute the basis for the provision of all services, including wireless access and, as an alternative, fixed telephones, which will end up being a mere tariff option within the mobile service.

Within this process of migration towards one or the other future scenario, VoIP softswitching will see increasing use in established networks to maintain their cost competitiveness. In this regard it is worth quoting the statement made to the 2004 meeting of the World Economic Forum by FCC Chairman Michael Powell, who, after observing that companies offering VoIP have experienced rapid growth thanks to the demand for low-cost calls of a quality comparable to that provided by conventional telephony, said that this constitutes "the most significant paradigm shift in the entire history of modern communications, since the invention of the telephone". Even so, the FCC has not expressed any intention to introduce specific rules for Internet telephony.

In the new environment, satisfying the demand for universal service could quite rapidly change from the use of conventional public telephony or fixed services made accessible to specific minorities in the interests of equalization, to more rapidly deployable mobile telephony based on prepaid cards and the extension of broadband Internet services to schools, health services and community centres (i.e. telecentres).

And it is in this context of new technologies that network modelling will accommodate this further complexity in addition to the complexity involved in tailoring its features to the specificities of each country (geography, territory, economy, etc.), taking account of the decisions made in each market with regard, among other things, to the adaptation of accounting or historical costs to current costs (and possibly forward-looking costs), determination of the level of the reasonable rate of return based on the country risk coefficient and Beta coefficient of the market, levels of idle capacity to determine the basis of the LRIC calculation and the absorption of common costs in each service.

The technological change that networks are undergoing in the evolving landscape will ultimately bring the regulator to a situation in which it sees networks and their costs as having less relevance within the overall changing picture. It is not in vain that studies are being pursued within the context of ITU on, among other important issues, the NGN phenomenon and the regulatory implications of VoIP services.

Many operators are now looking seriously at the migration of their networks. Examples of this are already to be seen in Europe. For instance, British Telecom has selected providers to offer competitive advantages to the business market on the basis of next-generation networks, as well as more accessible services to the best consumers. In the meantime, various incumbent operators in the TAL region are already bringing packet switching into their conventional networks as a means of achieving gradual migration.

In principle, it has to be accepted that the estimation of costs on the basis of accounting information and, to a greater extent, the application of cost models, initially of the top-down type, to basic switched fixed telephony networks, will provide the regulator with a basic set of objective criteria for setting its market prices and for the reasonable adaptation, within a given time sequence, of the operator's historical costs to efficient costs, with the possibility of a subsequent move towards a bottom-up version which could then also be used for the purposes of comparison with the costs and prices in other markets (benchmarking).

However, such studies will certainly not resolve all the issues currently facing the market. We have already seen that the use of cost models is, from the outset, limited by the gap between theory and practice, and it is for this reason that costs are to be seen as a point of departure, but not the be all and end all of the process.

A paper by T. Kelly and S. Tanaka[9] points out that costs are solely tools for determining prices, the setting of which calls for a process of negotiation in which other factors are taken into account. In other words, one cannot expect to achieve final price determination by means of a cost model and cost calculation.

As things currently stand, the accelerated rate of technological change means that there is less time in which to recover the costs incurred, such that the short-term imposition on the incumbent operator of LRICs (i.e. of LRIC-based tariffs) may compromise its economic situation, particularly where its competitors (in the case of liberalized markets) choose to attack the most profitable segments, thereby achieving a better revenue-to-cost ratio.

It is of course possible to require such entrants to make a contribution to supporting universal service if the corresponding deficit is to be made up to the entity providing it (typically the incumbent), but that contribution will not extend to the less profitable segments of the incumbent's business, which it will have to keep active through existing networks. It is for this reason that the regulations in regard to cost-oriented tariffs have allowed for adaptation and a sequential approach in those countries that have opened up their markets to competition.

Within the bounds of viability (that viability having to do with legal and regulatory, technical, market development and size of economy considerations), the countries most advanced in the liberalization process have found competence to be the key factor in the competitiveness and efficiency of the market players, whose costs will be adjusted in proportion to the level of their rivalry.

From the point of view of policy-makers and the regulator, the ultimate aim of competition is to enhance consumer satisfaction and optimize the assignment of resources. However, this market adjustment approach is, to the extent possible, the most direct means of achieving cost-oriented prices. In this competitive context, the authorities need to be more concerned with safeguarding competition than with monitoring the internal workings of each operator's business.

Safeguarding competition implies, among other actions, defining the relevant markets, determining the existence or otherwise of market power (i.e. the ability of a given market player to exert an influence on prices or quantities), identifying possible abuses of a dominant position, establishing provider obligations, removing any remaining barriers to competition and accepting or refusing company groupings.

By way of an example, and within the regulatory sphere but relating directly to the removal of barriers to competition, a significant competition-boosting move on the part of Europe and the United States has been the introduction of number portability, in the first instance within fixed services and within mobile services, although currently under consideration is the future availability of fixed to mobile portability, which would be of great interest to the TAL region, where the new alternative networks are for the most part mobile. Also up for study at some point will be the portability of IP registries.

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[9] T. Kelly and S. Tanaka, "Global trends in telecom development & new challenges for developing countries", Seminar on Costs and Tariffs, Paramaribo, ITU (May 2004).

In a future scenario of service and multiple-offer convergence (generically known as "triple play", or, if we add mobility, "quadruple play"), with an accompanying trend towards flat tariffs at least for a basic offering of such services, we may expect networks to experience no access deficit and that each provider will be able to obtain most if not all of its revenue from its own customers, with the result that networks will move naturally towards economic forms of interconnection of the "bill and keep" type – a situation to which the United States FCC has gradually been opening up. At the same time, this does not eliminate the need to continue compensating isolated and higher-cost regions, inasmuch as the aim is to reduce the levels of discrepancy between regions and social groups in terms of access to services in the context of the service's universal nature.

This landscape of new converging and more competitive networks, with new services, will at the same time, depending on price and revenue elasticity and new consumer demands, lead to lower prices and higher (in terms of capacity) traffic volumes. The greatest challenge for competition is thus to secure higher revenues for all (or almost all) of the players, while at the same time ushering in a new equilibrium with greater well-being on both sides, namely demand and supply.

In that future scenario it will also be necessary to review the scope of the USO concept, and hence of the associated cost.

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CHAPTER V

Summary and conclusions

5.1 Recapitulation

This paper, entitled "Study on the application of cost models in Latin American and Caribbean countries", is intended to serve as a contribution to a better understanding of the basic principles regarding the cost approaches and/or models used in Latin America for the regulation of reference tariffs and/or prices, in pursuance of the conclusions reached in the course of the discussions held during the TAL Group meetings held in Argentina in 2005 and Brazil in 2006. The study was conducted by ITU's Telecommunication Development Bureau (BDT), in coordination with the Chairman and Vice-Chairmen of the TAL Group.

To obtain the basic critical information needed in order to meet the stated objective, we drew up, as part of the project, a standard questionnaire to which we asked the administrations of the countries of Latin America and the Caribbean (TAL Group) to respond. The study called for processing of the replies received, with presentation of the findings during the TAL Group seminar and meeting held from 20 to 23 February 2007. At the same time, in the interests of compensating for any delays or failure to respond on the part of any administrations, we also saw fit to call on other sources of information.

By the end of the study, a total of nine administrations had replied to the questionnaire, which meant that the work was carried out essentially on the basis of alternative sources. As a result of this, the report concentrates on:

– critical conclusions in regard to common factors, differences and the general situation with respect to processes for aligning tariffs on costs,
– the gathering of operator data by regulatory bodies,
– elaboration of cost and accounting separation manuals by administrations,
– construction of cost models and/or pilot or advanced experiences with the application of cost models in the region.

Chapter I gives an account of theoretical considerations and of the international and regional recommendations on costs and cost models, with particular reference to the features of the TAL and COSITU models. Chapters II and III focus on the gathering of experiences from the region and conclude by looking at basic elements from accounting records that can be used for obtaining cost information by service. Chapter IV discusses the general status of telecommunication regulation, summarizing the "main common approaches" within the region and taking a look at the work that lies ahead.

To sum up, it may be said that the international trend is towards price freedom in competing telecommunication service markets and the imposition of regulated tariffs with **cost-oriented prices**.

Cost measurement calls for the **separation of costs between services** which for the most part are jointly provided, particularly where public telephony service networks (fixed) are concerned. Within the context of interconnection, costs from other networks, including those carrying mobile telephony services, are also analysed.

Theory has it that the most suitable costs for determining telecommunication service prices are **long-run incremental costs (LRIC)** based on forward-looking costs, the corresponding models being known as "top-down" or "bottom-up".

The separation of costs between services, starting out from the historical costs recorded in the statutory accounting records of the operating companies, calls for correct assignment of the shared costs (i.e. those corresponding to more than one service) and common costs (i.e. those corresponding not to services but to the company's general operations). Although the practice has commonly been to assign historical costs using the FDC approach, the ABC approach has now come to be the one more commonly accepted within the region.

Cost models were developed as an investigatory tool to assist administrations in the regulatory task of determining cost-oriented tariffs. Such models seek to overcome diverging levels of information accessibility ("information asymmetry") between regulators, whose task it is to set prices, and operating companies, which have all of the necessary data in their accounting and other records, are familiar with every detail of the business operation and are more up to date with the most cost-effective network technologies available.

Models are generally used to establish theoretical costs for an efficient service comprising an optimum operation using the best-priced technology available on the market. To elaborate such models, recourse is had to theoretical or virtual engineering constructions into which data is subsequently loaded. This will either be the historical data provided by companies (top-down models), with a view to subsequent correction: 1) of the historical costs, in order to derive actual costs, and 2) of the operations, in cases where they could be made more efficient; or purely theoretical data, in which case models of the bottom-up type are constructed.

In practice, all three versions (historical, actual and long-run incremental costs) are used as tools for testing the relationship between costs, prices and tariffs.

Within the region, the TAL model (ITU-T Recommendation D.400) was developed to serve as a general guide for setting costs for the termination of international telephony services on local networks. This model is not of an engineering type but is rather a set of best practices and standards that enable proper cost determination. The TAL model recommends use of the ABC cost assignment approach for accounting separation and the use of actual costs based on historical costs together with possible future migration to forward-looking costs. It also uses the WACC approach for determining capital remuneration.

As in the most widely-accepted international recommendations, adoption of the WACC method calls for defining the adequate rate of return on capital, taking as a basis the return on capital without risk, to which is added the country risk in each case and the Beta coefficient of telecommunication sector volatility on the open stock market.

For its part, ITU's COSITU model, which is of an engineering type, calculates the costs of all services and not only termination. It is a valid tool which satisfies the TAL model recommendations in regard to international traffic termination and which is used for establishing efficient theoretical costs for different types of network – fixed, mobile, Internet – by means of LRIC approaches. In addition to calculating service costs, the COSITU model can be used to perform exercises and projections in regard to possible scenarios involving the adaptation of tariffs to costs and elimination of the access deficit.

The countries of the TAL region are making progress in the application of cost methods which bring to bear on a large majority of their regulatory frameworks the full validity of the cost-oriented tariff approach in the case of services whose prices are regulated owing to the absence or

inadequacy of competition. At the same time, **the majority of administrations consider that cost models which report on the status of their services should, of necessity, be tailored to the specific characteristics of each country**, such as to take account of topology, population density or relative income levels, or a combination thereof. In this regard, the conclusions set forth in the report of the TAL Group meeting held in Brazil in 2006 once again highlight the specific needs of each country in regard to the cost model.

The possible alternatives are considered to be:

1) construction of a model for each country; or

2) by way of a second-best solution, the development and/or adaptation of a flexible model that can be tailored to the specificities of each case, thereby making it an acceptable option for different countries.

The choice between the options will depend on the regulator's optimum use of its resources and on the availability of experience data.

Several of the region's administrations are conducting cost studies and, in most cases, are also working on the definition of a format for the adequate separation of costs among services, this being the point of departure for a workable process for defining efficient service costs. At the same time, a number of administrations are working on the construction of their own cost models.

The standard format most commonly used for the accounting separation of costs within services is the one corresponding to the ABC approach, which facilitates the correct assignment of those costs that cannot be directly attributed to a particular service, i.e. shared costs and common costs, based on the definition of activities. Certain activities are defined generically, i.e. network deployment and operations, customer care and general administration.

The results of the studies, whether we are looking at historical costs, actual costs or forward-looking costs, must then be compared with the actual situation, there being various transition processes, consequent upon and according to the gap identified, that are put into effect for the purpose of applying cost-based prices.

Many of the region's administrations find that the use of benchmarking provides them with valuable international references for determining the possible differences there may be between the prices in force and those that would result from more efficient levels of service.

Significant discrepancies have also been found to exist in the relative prices of services among the countries of the region. Although this has partly to do with natural differences (topology, networks, etc.), which, as we have already pointed out, would justify the view of the region's regulators that there should be national rather than generic cost models, the level of price dispersion within the region constantly serves to remind us of the need for steps to be taken to bring tariffs into line with costs and hence of the need to implement the necessary stages of adaptation.

But in addition to this flexibility, in terms of the application both of the models which need to be tailored to the specific situation of each country and of the results which call (or normally call) for periods of transition and negotiation according to each prevailing situation, there is the need to consider the major changes that are occurring in the technology used to provide the services, with networks having to diversify in order to accommodate the new engineering solutions that are adopted vis-à-vis the original models, as well as convergence between services, which can give rise to new definitions in regard to services and their separation and to the quality of service required.

We have seen that the current trend within the region is to deploy mobile networks whose level of penetration generally surpasses that of conventional (fixed) telephony. This reveals a significant area for substitution between services and for possible repetition of the generic phenomenon that has occurred at the international level, known as fixed-mobile convergence (FMC). In this context, conventional cost models based on the PSTN will tend to lose their relevance.

In generic terms, and among other clearly-defined phenomena, networks are gradually migrating from circuit-switching to packet-switching, from local-loop solutions to wireless terminals, and from a separation between fixed and mobile services to their convergence.

The challenge facing regulators is therefore a broad one, since, in addition to the inherent difficulty of implementing cost studies and models, they have also to deal with processes of transition, negotiation and adaptation in order to achieve the objective of cost-oriented tariffs, while at the same time determining how to take on board the changes that are occurring in the technologies and applications pertaining to telecommunication networks and services.

5.2 Preliminary conclusions – possible evolution of TAL and COSITU models

1) In terms of behaviour and diagnosis in regard to the status of telecommunication service costs in the TAL region, administrations are unanimous in drawing attention to the intrinsic specificities which necessitate the development of customized models, which would *prima facie* result in the construction of ad hoc cost models.

Along the same lines, administrations have agreed on the need to review the TAL model for determining international telephone traffic, which, as we have seen, consists in a set of best practices and standards deemed by consensus to be the most appropriate. The idea is that it should now be seen as the starting point for extension to the calculation of costs for all services, and hence for the compilation of cost manuals. Although the primary objective would be to arrive at current or actual costs on the basis of historical costs, the resulting information can also be adapted in order to derive forward-looking costs reflecting full efficiency in service provision.

2) TAL Group administrations which have not yet defined formats (manuals) of accounting and account separation information for operating companies providing services that are subject to price control or monitoring should take broad account of the recommendations that are available to that end, as well as of the experience accumulated by other administrations in the region.

3) Experiences with accounting manuals for accounting separation between services based on the ABC approach are the most widely accepted and best suited to the requirements of future cost studies in respect of services.

4) The application of LRICs would be the next stage. Use of ITU's COSITU model, with the proxy function that all engineering methodologies include, and given its compatibility with the TAL model approaches and recommendations, could be considered a second-best alternative. We would, however, draw attention to the need to test the model's architecture with a view to its possible tailoring to the features that are specific to the countries of the region and which have been highlighted by administrations attending TAL Group meetings.

To this end, we would consider it appropriate to conduct an experiment in a country with widely varying characteristics (topological, economic, etc.). The existing model should be tailored to take those characteristics into account, as called for by administrations, and the results validated. If the experiment proved successful, use of the model could be extended to all the administrations, whose efforts in this regard would thereafter no longer need to be dispersed.

5) The above notwithstanding, and with a view to the availability of alternative measurement options for implementing cost-oriented price policies, benchmarking is a valuable tool that the TAL Group countries can use for the purpose of adapting tariffs and monitoring prices and which continues to be a valid and very low-cost instrument for the proxy calculation of possible values, particularly when compared with the kinds of study that produce final results only after a lengthy period of time.

To this end, the second part of the questionnaire developed for the purposes of implementing this study is intended to permit a broad comparison of tariffs, prices, costs, CAPEX and OPEX, among other significant variables, within the TAL Group Member States.

Such a comparison, once analysed and with the necessary corrections in respect of, among other things, nominal and parity exchange rates, relative income differences and demographic variations, would provide results that could be analysed in terms of the most significant divergences, their implications and possible policy recommendations. For all of these reasons, it is considered desirable that this task should be taken forward in the interests of providing administrations with a valuable reference tool. Likewise desirable would be an annual updating of the benchmarking function.

6) Transition processes, where properly implemented, constitute another worthwhile instrument for moving away from historical values reflecting something less than maximum service efficiency towards values that are considered, within the different technical alternatives, to be more acceptable in terms of their alignment on costs.

7) In today's evolving context, studying costs in the different services is important not only for pricing purposes, where prices are subject to control, but also in the interests of safeguarding competition, to which end there has to be access to the kind of information that enables action to be taken, as necessary, to avoid cross-subsidies, predatory pricing and other anti-competitive practices.

5.3 Impact of technological change – next-generation networks (NGN)

The convergence of technologies and networks should send us a serious warning as to the limited scope of static models that consider situations in a way that fails to take account of the constant process of change that now characterizes technologies and their applications, with the consequent changes that are to be seen in the type and quality of services. This new environment calls for a new way of seeing things and for the introduction of corresponding changes in regulatory policy.[10]

The trend being followed by networks, be it towards fixed-mobile convergence, broadband networks with a multiplicity of offerings or wireless networks providing a wide range of applications to different types of terminal, with the introduction of VoIP and the conceptual change from circuit switched technology to IP-based packet switching, presents us with a future of changing values, with services that are more economical but of varying scope, such that the regulator's indicative task will have to be very flexible (light-handed regulation) if it is not to become a hindrance, putting a brake on the technological progress that is meant to be benefiting the end consumer.

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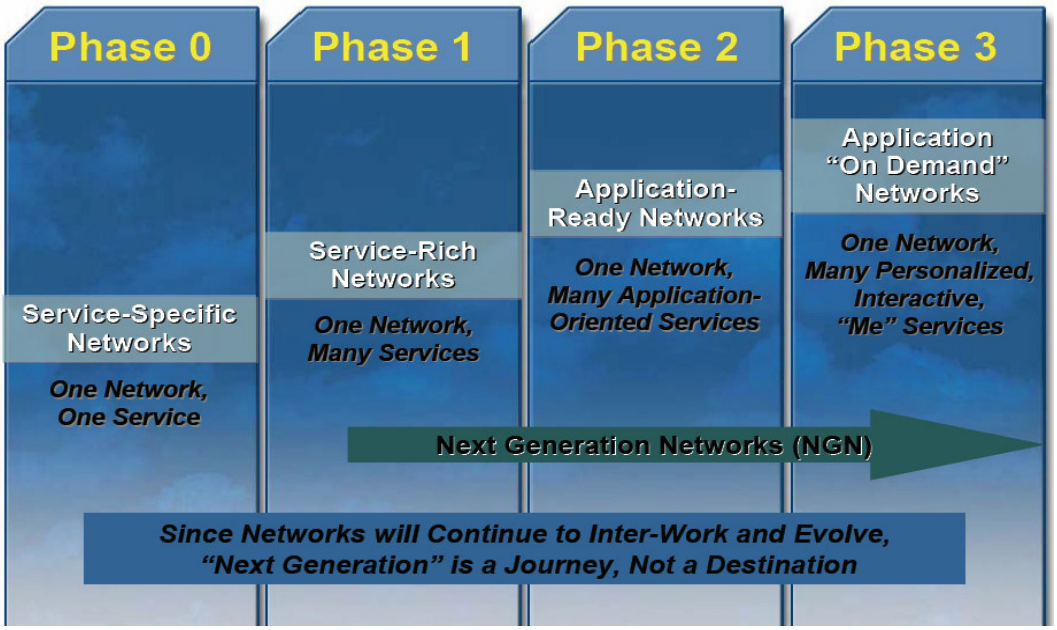
[10] An ERG document (see Bibliography) states in this regard that "In a dynamic innovation driven market with the constant potential for disruptive technologies emerging, it is often impossible to predict with any degree of confidence the likely direction the market may take".

Traditional networks are migrating, in an evolutionary, stage-by-stage process, towards NGN, moving away from the former system of linked networks providing specific services and towards networks that are capable of adapting to the needs expressed by current demand, as can be seen in the diagram provided by Cisco, extracted from the paper by Antoni Fusté.[11]

NGN evolution as seen by CISCO



ITU's conclusions (2004) regarding the fundamental characteristics of next-generation networks are as follows:

- All kinds of service using all kinds of medium
- Decoupling of services and networks
- Interworking
- Open interfaces
- Generalized mobility
- End-to-end quality of service.

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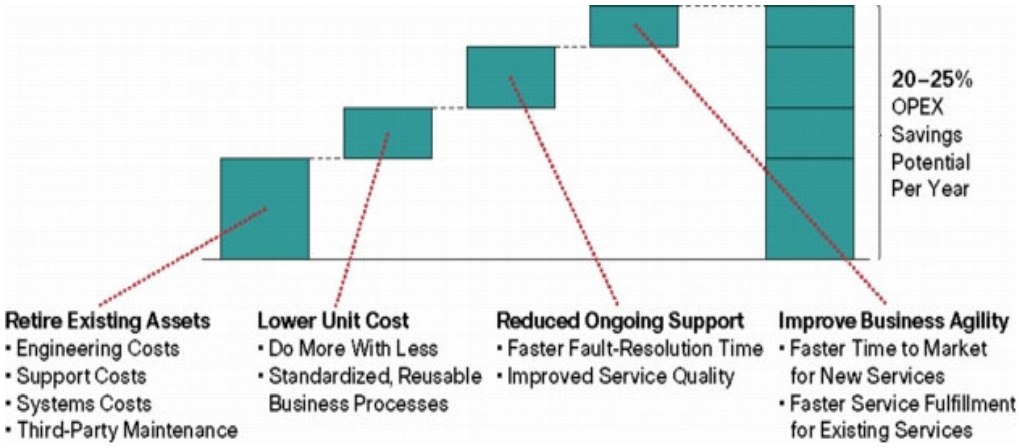
[11] Fusté, Antoni E., "Desarrollos Tecnológicos. Convergencia y Redes de Nueva Generación [*Technological advances. Convergence and next-generation networks*] ", Professor at ETSETB-UPC, Adviser to CMT, III Meeting Regulatel-IRG, La Antigua, Guatemala (4-6 December 2006).

Operators see NGNs as the bearers not only of new service opportunities but also of lower costs and productivity gains. In other words, they see a scenario in which it is possible to derive higher revenues while improving the relationship with the customer (user) and lowering investment (CAPEX) and operational (OPEX) costs. It has been privately estimated (Cisco) that, in the context of convergence towards new NGNs from existing circuit-switched networks, the IP backbone alone makes for an annual reduction in operating costs of 20 to 25 per cent, as can be seen in the following figure:

Reduced operational costs with converged network backbone



(Source: CISCO)

The new networks with their lower costs and broader range of applications thus represent a challenge for existing networks, and hence for regulators. Indeed, remaining faithful to the criterion, associated with the LRIC concept, of most economic cost for technology available on the market, would result in major discrepancies vis-à-vis the existing costs, inasmuch as this process is considered to be the one that prevails in the TAL Group countries.[12]

It is for this reason that the TAL Group should study the impact of this phenomenon in the light of ITU-T Recommendation D.400. Regulators need, on the one hand, to take stock of such advances within the region's networks, and, on the other hand, to give consideration to the economic implications of the process of "negotiation" and transition in regard to existing operators in the interests of ensuring the best possible price/quality ratio in terms of the services provided to consumers through time, at the same time taking into account any remaining levels of idle capacity and the rates at which the transition to new networks is occurring and market demand evolving.

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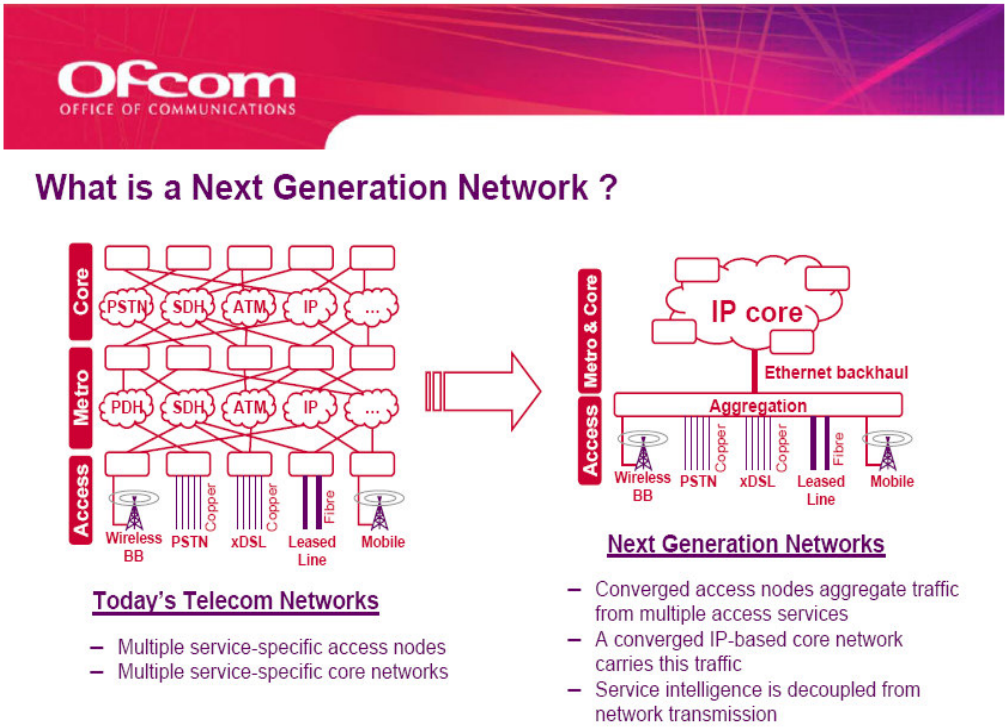
[12] Graeme A. Guthrie (Victoria University of Wellington), John P. Small (University of Auckland), Julian Wright (National University of Singapore), "Pricing access: Forward-looking versus backward-looking cost rules", School of Economics and Finance, PO Box 600, Victoria University of Wellington, Wellington, New Zealand.

Measures designed to encourage the normal flow of technological innovation and give fresh impetus in areas where progress has already been achieved, for example number portability, may be accompanied by other measures intended to protect the consumer, for example the availability of appropriate and transparent information regarding the quality of service of seemingly similar offerings (for instance, VoIP vs voice communication via traditional telephony).

A further direct consequence of the "new networks for all types of service" scenario is the need to reassess the importance and modalities of service provision under the universal service obligation, and hence also the corresponding impact on costs and funding mechanisms.[13]

NGNs will enable the operator to use just one network for providing a whole range of services without having, as at present, to operate different networks for different services (e.g. fixed and mobile networks for fixed and mobile services), in addition to which they will make for greater transport flexibility and open architectures requiring less investment for a given volume of information carried and delivered to the consumer.

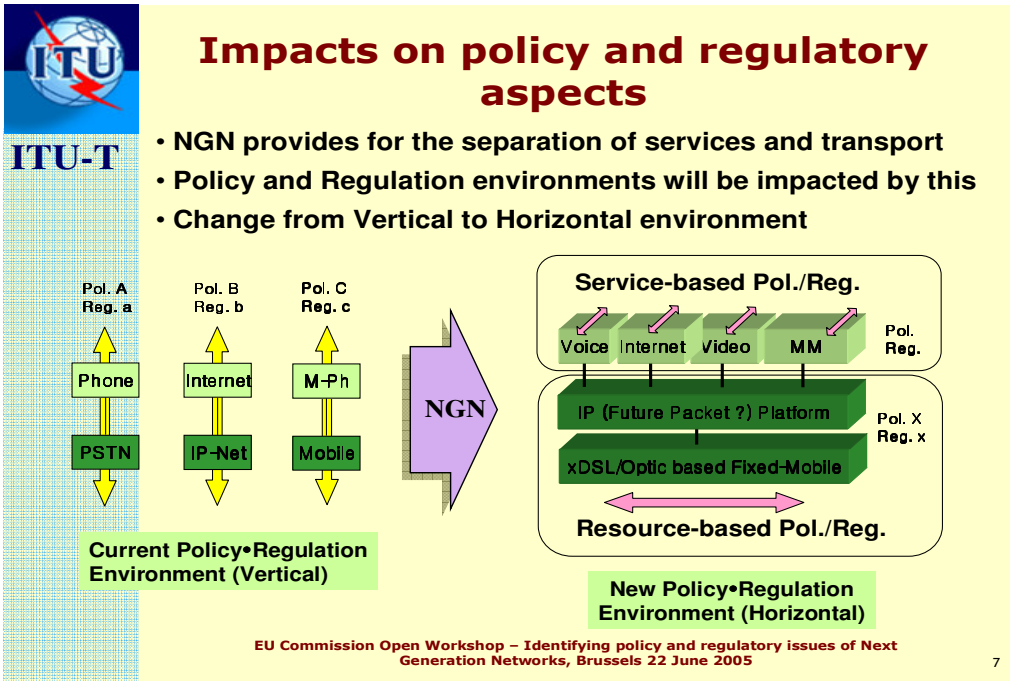
This new network and services structure is depicted in the following diagram produced by the United Kingdom Office of Communications:[14]



[13] See "Rethinking universal service for a next generation environment", OECD (April 2006).

[14] OFCOM, Steve Unger, Director of Telecoms Technology. "Next Generation Networks: An Ofcom perspective", (June 2006).

This move from a vertical to a horizontal environment calls, as we have already seen, for a fundamental change in the regulatory approach. At an ITU-T Study Group 13 workshop[15], the problem and the challenges it throws up were presented in diagrammatic form:



In this context the regulatory function must of necessity adapt itself to the conditions prevailing in the new environment, primarily in order to facilitate rather than obstruct the evolutionary process, in particular by enabling the convergence of fixed, mobile and broadband services, which in some cases remain separated solely on account of the regulations in force. At the same time, administrations must encourage the technological evolution which promotes competition between operators and improves the general well-being, while paying attention to the effects of network obsolescence, including its effects on the services carried.

It is clear that NGNs represent a higher-risk context for investors, owing to the competition in that market, rapid technological change and uncertainty in regard to changing consumer demand. It is therefore important not to raise the level of regulatory risk. Indeed, regulation should be geared solely towards correcting market discrepancies, i.e. providing regulation/guidance where prices in non-competitive segments are concerned. The rate of technological change should send us a clear signal as to the importance of avoiding regulation based on legacy approaches centred around circuit-switched PSTNs.

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[15] ITU-T Study Group 13 Chairman Lucent Technologies. Moore, B., "Some comments on ITU-T work on NGN". ITU-T Study Group 13 Chairman Lucent Technologies. EU Commission Open Workshop. Identifying policy and regulatory issues of Next Generation Networks, Brussels (22 June 2005).

These conclusions go hand-in-hand with the outputs of the World Telecommunication Development Conference (Doha, 2006), which identified the following, among others, as ITU-D study group questions:

- Regulatory impact of next generation networks on interconnection
- Regulation for licensing and authorization of converging services
- Tariff policies, tariff models and methods of determining the costs of services on national telecommunication networks, including next-generation networks.

In this regard, it would be highly desirable to ensure an appropriate level of liaison between the studies being carried out by the TAL Group and those being done by ITU-D.

These issues are at the heart of the current debate on the future of telecommunications and their regulation, given the changing paradigms in regard to competition, costs and market prices. While we are not in a position to foresee the results of the aforementioned studies, it is already clear that NGNs constitute a challenge to the existing models used for cost studies and to the conceptual application of LRICs. And while it is possible to analyse the costs of these new networks, the fact that they are used to provide a multiplicity of services, coupled with the practice of bundling, makes it more difficult to separate out the costs and prices of each service. At the very least, it is necessary to revise the cost drivers for the new networks, insofar as the aim is to maintain the accounting separation approach. On the other hand, the cost measurement units may well become units of capacity rather than units of time.

Regulators must therefore give their full attention to the process of evolving towards the new networks, and this must include focusing on efficiency and quality of service. While it is basically understood that NGNs will result in lower costs, the initial stage of their deployment will require an effort on the CAPEX (investment expenditure) side, given the need to dismantle the old networks and redefine the relationship between marginal costs and marginal revenues, since it is the operators' business model itself that has to be redefined. In this new, single-network environment involving redefinition of the business model, tariff policies will tend to be aligned on real market demand and on the resources actually consumed in order to satisfy it (backward cost assignment).[16]

The regulator will also find itself up against a different competitive environment characterized by multiple offers containing a variety of services within the same package (bundling). This represents a further challenge to its competition safeguarding activities since such bundled offerings can serve as a tool for unseating market rivals. The regulator's task of both safeguarding and fostering competition is therefore set to expand as it reviews the bases for the licensing and – as has already been mentioned – numbering and portability regimes, as well as the dividing lines that have hitherto existed between services. Nor must we forget that the definition, scope and funding of the universal service are also up for review.

The network interconnection paradigm is also liable to change with the move towards interconnection between similar networks, which means that we should maintain the "bill and keep" approach, which will be relevant in the medium term.

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[16] See the presentation by Soto Oscar González, ITU Consultant Expert, Strategic Planning and Assessment, "Guidelines for network planning tools (GNPT)", ITU-BDT Regional Network Planning Workshop with Tool Case Studies for the Arab Region, Cairo, Egypt (16-27 July 2006).

From all of the foregoing, it can be seen that in addressing our task and formulating our recommendations we have tackled issues that go beyond the primary aim of the study but which cannot be neglected given the international trends that have already begun to make themselves felt in the region, with telephony companies introducing softswitching and adapting their networks to enable the provision of television services via the telephone line, thereby maximizing its potential; cable television companies gaining ground in the provision of Internet and VoIP services; and mobile telephony companies taking over from traditional fixed services while at the same time advancing along the road towards broadband wireless networks. And these are only some of the phenomena we are witnessing.

ITU and the TAL Group countries have made considerable efforts to secure the advances that have thus far been made in the study of costs and process of achieving cost-oriented tariffs. However, this task, already an intensive and painstaking one, will need to be expanded to encompass studies on the impact of NGNs on telecommunication development, including an analysis of the various issues relating to costs, prices, competition and the market.

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ANNEX

Questionnaire distributed to the Tal Group Administrations

Study on the application of cost models in Latin American and Caribbean countries

With the aim of bringing about a better understanding of the cost approaches and/or models used in Latin America for the purpose of regulating reference tariffs and/or prices, the Telecommunication Development Bureau (BDT), in coordination with the Chairman and Vice-Chairmen of the TAL Group, is carrying out the above-mentioned study together with Mr Guillermo Klein, as was discussed during the TAL Group meetings held in Argentina in 2005 and Brazil in 2006. We would kindly request all members of the Regional Tariff Group for Latin America and the Caribbean (TAL Group) to provide the information requested. Once it has been received and processed, this reference data, of value to regulators and operators alike, will be redistributed among the participating countries and presented during the course of the TAL Group seminar and meeting to be held in early 2007.

We thank you in advance for your collaboration.

REQUEST FOR INFORMATION

PART ONE

1 Legal and regulatory framework – background:

1.1 General principles or general guidelines provided for in the legal framework for the regulation of reference tariffs and/or prices.

1.2 Complementary regulatory provisions (contracts, regulations or instructions).

1.3 Accounting information required from operating companies for regulatory purposes:

- Chart of accounts
- Accounts manual
- Revenue and cost assignment manual
- Tariff setting or regulation model
- Other information considered to be of key importance.

1.4 Regulatory body's costing system (if applicable, please describe the one corresponding to your methodology):

1.4.1 Aggregated costs by fixed telephony service (local, domestic long-distance, international) and other services (Internet, mobile telephony), for example:

a) Exploitable fixed capital:

- Local switching
- Long-distance switching
- International switching
- Outside plant

- Copper cabling
- Fibre
- Wireless systems

– Transmission systems
– Buildings, land, towers and other fixed installations
– Furniture and equipment
– Tools
– Vehicles
– Other (please specify)

b) Labour costs: (OPEX)

– Operations
– Marketing
– Administrative

c) Financial and other (please specify) (CAPEX)

1.4.2 Costs broken down by component elements of fixed telephony services, among others:

- Local service area (subscriber chip, copper cabling and other technologies, local interface, etc.)
- Transmission
- Trunk system
- Signalling
- Other (please specify)

(Please indicate whether or not the cost breakdown includes basic information on the definition of clusters, topology and other surface features)

2 Do the regulatory body and/or operating companies use any of the following systems for the purposes of: a) setting interconnection charges, b) tariff-setting for services without effective competition, c) calculating the cost of the universal service obligation?

2.1 Historical costs
2.2 HCPM
2.3 LRIC (bottom-up)
2.4 LRIC (top-down)
2.5 Benchmarking
2.6 COSITU
2.7 Contractual
2.8 Other (please specify)

3 Tariff control in telecommunication services:

3.1 Please indicate whether any of the following are applied:

3.1.1 Price cap

3.1.2 Rate of return:

3.1.3 Other:

3.1.4 Frequency of review:

4 Details of services subject to cost-based tariffs:

5 Costing system used by companies subject to regulation in regard to cost calculation, idem previous point

6 What were found to be the advantages and difficulties involved in applying the systems described?

7 What administrative, arbitration and legal bodies are provided for in the regulations for the purpose of settling disputes between providers and the regulatory authority?

8 Please make a comparison between the tariffs currently in force and those resulting from the application of one or more of the systems listed in § 2 above

9 Have you conducted any benchmarking that has had an impact on tariff regulation?

10 In the absence of any immediate impact, what results have you obtained from the comparison?

11 Do you consider it useful, by way of an initial comparative approximation of the level of prices and tariffs, to use benchmarking among the TAL Group member countries?

12 How are universal service costs financed?

13 Have tariffs been rebalanced? If so, please indicate the methodology used

14 If there is an access deficit, please explain how it is financed

15 Accounting information for regulatory purposes:

If there is a standard set of instructions, please submit them together with the completed questionnaire. In addition, please give a web address for the annual report of each operating company.

Main approaches used in the following cases:

15.1 Valuation of exploitable assets

15.2 Depreciation and/or amortization

15.3 Cost of capital and return on capital

15.4 Revenue and cost assignment

15.5 Drivers used for estimating shared costs

15.6 Accounting separation

15.7 Any others considered to be of relevance (please describe)

PART TWO

TAL Group

Study on the application of cost models in Latin American and Caribbean countries

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With the aim of bringing about a better understanding of the cost approaches and/or models used in Latin America for the purpose of regulating reference tariffs and/or prices, the Telecommunication Development Bureau (BDT), in coordination with the Chairman and Vice-Chairmen of the TAL Group, is carrying out the above-mentioned study together with Mr Guillermo Klein, as was discussed during the TAL Group meetings held in Argentina in 2005 and Brazil in 2006. We would kindly request all members of the Regional Tariff Group for Latin America and the Caribbean (TAL Group) to provide the information requested. Once it has been received and processed, this reference data, of value to regulators and operators alike, will be redistributed among the participating countries and presented during the course of the TAL Group seminar and meeting to be held in early 2007.

We thank you in advance for your collaboration.

1 **Telecommunication companies:** in dollars, at the exchange rate in force at 31 December 2005.

1.1 Total telecommunication sector sales revenue

1.2 Net telecommunication sector assets and equity

1.3 Total exploitable assets

1.4 Investments

1.5 Net pre-tax benefit in fiscal year

2 **Incumbent companies:** in dollars, at the exchange rate in force at 31 December 2005 (if more than one incumbent, please provide data for each)

2.1 Total sales revenue

2.2 Net assets and equity

2.3 Total exploitable assets

2.4 Investments

2.5 Net pre-tax benefit in fiscal year

2.6 Minimum agreed salary for telecommunication sector employees in the following categories:

- 2.6.1 Manager
- 2.6.2 Supervisor
- 2.6.3 Clerk (starting)
- 2.6.4 Unskilled worker (starting)

3 **Fixed telephony: information regarding incumbent company/companies** (if more than one incumbent, please provide data for each)

3.1 Lines as at 31 December 2005

3.1.1 Total installed lines

3.1.2 Total lines in service

3.1.2.1 Business

3.1.2.2 Households

3.1.2.3 Government

4 **Monthly subscription:** in dollars, at the exchange rate in force at 31 December 2005 (if more than one incumbent, please give the arithmetic average):

4.1 Business

4.2 Households

5 **Local and local long-distance calls:** in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period (if more than one incumbent, please give the arithmetic average)

5.1 Local calls

5.2 Long-distance calls

5.2.1 Up to 50 km

5.2.2 Up to 100 km

5.2.3 Up to 300 km

6 **International calls:** in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period (if more than one incumbent, please give the arithmetic average), terminating in:

6.1 North America

6.2 Central America

6.3 South America

6.4 Europe

6.5 Asia

7 **Local-loop unbundling:** in dollars, at the exchange rate in force at 31 December 2005 (if more than one incumbent, please give the arithmetic average)

7.1 Full

7.2 Partial

7.3 Other (please specify)

8 Fixed telephony – non-incumbent companies:

8.1 Lines as at 31 December 2005:

8.1.1 Total installed lines

8.1.2 Total lines in service

8.1.2.1 Business

8.1.2.2 Households

9 Monthly subscription: in dollars, at the exchange rate in force at 31 December 2005 (if more than one company, please give the arithmetic average)

9.1 Business

9.2 Households

9.3 Government

10 Local and local long-distance calls: in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period (if more than one company, please give the arithmetic average)

10.1 Local calls per minute

10.2 Long-distance calls

10.2.1 Up to 50 km

10.2.2 Up to 100 km

10.2.3 Up to 300 km

11 International calls: in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period (if more than one company, please give the arithmetic average), terminating in:

11.1 North America

11.2 Central America

11.3 South America

11.4 Europe

11.5 Asia

11.6 **Local-loop unbundling:** in dollars, at the exchange rate in force at 31 December 2005 (if more than one company, please give the arithmetic average)

11.6.1 Full

11.6.2 Partial

11.6.3 Other (please specify)

12 Economic data regarding mobile telephony (MT) companies (if more than one company, please provide data for each)

12.1 Total MT sector sales revenue

12.2 Net MT sector assets and equity

12.3 Total exploitable assets

12.4 Investments

12.5 Net pre-tax benefit in fiscal year

12.6 Total sales revenue for MT companies associated with the incumbents

12.7 Net assets and equity of MT companies associated with the incumbents

12.8 Total exploitable assets

12.9 Investments

12.10 Net pre-tax benefit in fiscal year [17]

12.11 Minimum agreed salary for telecommunication sector employees in the following categories:

12.11.1 Manager

12.11.2 Supervisor

12.11.3 Clerk (starting)

12.11.4 Unskilled worker (starting)

13 Mobile telephony – companies associated with the incumbent(s) (if more than one company, please provide data for each):

13.1 Subscriber data as at 31 December 2005:

13.1.1 Total subscribers

13.1.2 Total postpaid subscribers

13.1.3 Total prepaid subscribers

14 Local and local long-distance calls: in dollars, at the exchange rate in force at 31 December 2005 (if more than one company, please give the arithmetic average)

14.1 Local calls, per minute:

14.2 Long-distance calls:

14.2.1 Up to 50 km

14.2.2 Up to 100 km

14.2.3 Up to 300 km

15 International calls: in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period (if more than one company, please give the arithmetic average), terminating in:

15.1 North America

15.2 Central America

15.3 South America

15.4 Europe

15.5 Asia

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[17] Idem 1

16 **Roaming:** in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period (if more than one company, please give the arithmetic average)

16.1 Tariff charged to:

16.1.1 local operators

16.1.2 outside operators

17 **SMS:** average cost in dollars during normal charging period, at the exchange rate in force at 31 December 2005 (please indicate whether the charge is per message or per minute) (if more than one company, please give the arithmetic average)

18 **Mobile telephony – companies not associated with the incumbent(s)** (if more than one company, please provide data for each):

18.1 Subscriber data as at 31 December 2005:

18.1.1 Total subscribers

18.1.2 Total postpaid subscribers

18.1.3 Total prepaid subscribers

19 **Local and local long-distance calls:** in dollars, at the exchange rate in force at 31 December 2005, during normal charging period (if more than one company, please give the arithmetic average)

19.1 Local calls, per minute

19.2 Long-distance calls

19.2.1 Up to 50 km

19.2.2 Up to 100 km

19.2.3 Up to 300 km

20 **International calls:** in dollars, at the exchange rate in force at 31 December 2005 – average per-minute value during normal charging period, terminating in:

20.1 North America

20.2 Central America

20.3 South America

20.4 Europe

20.5 Asia

21 **Roaming:** in dollars, at the exchange rate in force at 31 December 2005 –average per-minute value during normal charging period

21.1 Tariff charged to**:**

21.1.1 Local operators

21.1.2 Outside operators

22 **SMS:** average cost of an SMS in dollars during normal charging period, at the exchange rate in force at 31 December 2005 (please indicate whether the charge is per message or per minute)

23 **Internet:** data as at 31 December 2005:

23.1 Total users**:**

23.1.1 Dial-up

23.1.2 ADSL

23.1.3 Cable

23.1.4 Other (please specify)

24 **Internet via companies associated with the incumbent(s): (if more than one company, please provide data for each)**

24.1 Total users – data as at 31 December 2005:

24.1.1 Dial-up

24.1.2 ADSL

24.1.3 Other (please specify)

25 **Prices:** in dollars, at the exchange rate in force at 31 December 2005 (if more than one company, please give the arithmetic average)

25.1 Dial-up, monthly subscriber

25.2 Cost per minute

25.3 ADSL[18], monthly subscriber

25.4 other (please specify)

26 **Internet via companies not associated with the incumbent(s):** monthly cost in dollars, at the exchange rate in force at 31 December 2005

26.1 Total users

26.1.1 Dial-up

26.1.2 ADSL

27 **Prices:** (if more than one company, please give the arithmetic average)

27.1 Dial-up, monthly subscriber

27.2 Cost per minute

27.3 ADSL[19]

27.4 Other (please specify)

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[18] Connection of up to 512 kbps with unlimited use

[19] Connection of up to 512 kbps with unlimited use

28 **Cable television companies:** data as at 31 December 2005:

28.1 Number of customers

28.2 Monthly cost in dollars, at the exchange rate in force at 31 December 2005, of a connection with a speed of up to 512 kbps and unlimited use (if more than one company, please give the arithmetic average)

29 **Interconnection:** in dollars, at the exchange rate in force at 31 December 2005 – revenue per minute

29.1 Fixed/mobile

29.2 Mobile/mobile

29.3 Fixed/fixed

29.4 Access

29.5 Transit

29.6 Termination

29.7 Roaming

29.8 SMS

29.9 Other interconnection services having a relevant impact on end user tariffs or prices

29.10 Other (please specify)

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