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SERIES D: GENERAL TARIFF PRINCIPLES

Recommendations for regional application –
Recommendations applicable to the African Region

Cost methodology for the regional tariff group for Africa applicable to the international automatic telephone service

ITU-T Recommendation D.600R

(Formerly CCITT Recommendation)

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ITU-T Recommendation D.600R

Cost methodology for the regional tariff group for Africa applicable to the international automatic telephone service

Summary

This Recommendation provides African administrations and/or recognized operating agencies, in their international relations among themselves or with others, with a tool able to serve as a transparent reference to ensure non-discrimination and cost-orientation in the rates they apply.

Source

ITU-T Recommendation D.600R was revised by ITU-T Study Group 3 (1997-2000) and approved by the World Telecommunication Standardization Assembly (Montreal, 27 September – 6 October 2000).

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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ITU-T Recommendation D.600R

Cost methodology for the regional tariff group for Africa applicable to the international automatic telephone service

1 Purpose and scope of Recommendation D.600R

ITU-T D.140, adopted by ITU-T, lays down the requirements for moving towards cost orientation in bilateral negotiations on accounting rates between international correspondents.

The lack of a universally accepted cost model and the differences in countries' capacity to collect and process basic data make it necessary to work out costing methods adapted to the ability of those who use them to provide the relevant information.

This Recommendation assumes that the entity applying it may have an incomplete system of analytical cost accounting, or no such system at all.

This Recommendation provides African administrations and/or recognized operating agencies, in their international relations among themselves or with others, with a tool able to serve as a transparent reference to ensure non-discrimination and cost orientation in the rates they apply.

2 Technical and operational context

2.1 Type of services

This Recommendation applies to the automatic international telephone service. It must be an aid for determining traffic termination costs in case the amount of a settlement rate or a termination charge has to be set. Furthermore, in order to provide a basis for tariff rebalancing, it also helps in determining indicative costs for domestic services.

2.2 Type of networks

No distinction is made between the different transmission media, on account of their convergence to optical fibre and satellite.

Nevertheless, in order to distinguish between neighbouring international traffic (routed over terrestrial transmission routes either side of borders) from overseas international traffic (via satellite and submarine cable), this Recommendation draws a distinction between subregional traffic and international traffic.

2.3 Cost model

The TAF Group adopted following guiding principles for the development of its cost model:

Transparency

The open availability of information used in the cost derivation process in order to allow comprehension of the final rate from the vantage point of an external analyst. The TAF model identifies costs relating to the different network segments in order to apportion the network cost to the different services according to the proportion in which they utilize each segment. This proportion is given by the relative traffic level.

Practicability

The ability to implement a costing methodology with reasonable demands being placed on data availability and data processing in order to keep the costing exercise economical, yet still useful. The TAF model must be made available in the form of a user-friendly computer application with total flexibility in setting the parameters so as to be able to be adapted to the specific situation of TAF Group members in terms of availability of data. The whole glossary must be accessible online.

Principle of causality

The demonstration of a clear cause-and-effect relationship between service delivery, on the one hand, and the network elements and other resources used to provide it, on the other hand. For the TAF Group, any network segment which, if eliminated, would prevent delivery of a given service has to be included as one of the cost components of the service. The proportion in which this network segment contributes to the cost of the service is a function of the relative use of that segment by the service in question. This use is measured by traffic level.

Principles of efficiency

The provision of a forecast of cost reductions that result from a more efficient combination of resources. For the TAF Group, efficiency takes account of four factors:

- installed capacity;
- utilized capacity;
- minimum reorder times;
- compound annual growth rate in total number of lines used.

Reasonable contribution to common costs

Costing methodologies should provide for a reasonable contribution to common costs. The TAF model apportions general support costs to all services in proportion to their levels of traffic.

Present value of costs

Amortization costs are re-adjusted to their current replacement value.

The TAF model takes account of two factors:

1) weighted mean growth rate of equipment prices in the country of the network operator;
2) currency depreciation in the country of the network operator.

Objectivity

The TAF model is based on a common understanding of the meaning of each of its parameters. The results obtained should not depend on the correspondent in the negotiations, unless it is possible to establish with certitude the specific features of the relation in question.

For the purposes of costing the telecommunication services they offer, for the application of international accounting arrangements, the administrations of the TAF Group member countries have agreed to use among themselves the cost model described in Annex A. They recommend the other regional groups to consider it as acceptable.

2.4 Calculation tool

The principles adopted in the TAF Group model can be computerized in order to help satisfy the following three requirements:

a) costing of services;

b) real-time generation of reference values for costing services;

c) provision, for those having insufficient data, of default values for the cost structure of the different network segments.

The TAF Group computer model would be an autonomous "client-server" type application.

ANNEX A

TAF cost model

A.1 Introduction

The Regional Tariff Group for Africa (TAF Group) adopted the principles of its cost model on 24 April 1999 in Dakar, Senegal. The model is based on the general concepts set forth in ITU-T D.140. In view of the applicability requirement, due consideration was given to regional specificities and to the need for a transparent tool that was acceptable to other regions.

A.2 Area of application

The TAF model is designed to calculate the cost of a one-minute automatic international telephone call. It allows for the fact that the costs of outgoing and incoming calls are not made up of the same elements and may therefore differ.

In order to distribute the costs fairly among the different services generating them, the model also provides for the identification of international subregional traffic[1] and of cross-border traffic[2], if required.

A.3 Particularities

Cost accounting

Although substantial progress has been made, the use of cost accounting is still not widespread among the members of the TAF Group. This makes it difficult, if not impossible, to identify all cost elements in detail and limits the applicability of certain concepts of cost calculation.

Low teledensity

The members of TAF Group generally have a teledensity of less than two main lines per 100 inhabitants. This has direct consequences on cost structure (distribution between fixed and variable elements) because telecommunication system components are modular and the conditions imposed by the market are such that these modules can be extended only at levels far exceeding the real needs of developing countries.

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[1] Subregional traffic: Traffic exchanged between countries near to one another via terrestrial transmission media shared with trunk traffic.

[2] Cross-border traffic: Traffic exchanged via a direct circuit group between the subscriber exchanges of two places that are very close to each other and located on either side of an international border.

Furthermore, the combination of low teledensity (and therefore low traffic volume) and unavoidably inappropriate modularity makes it difficult to use traffic variations as the sole basis for determining the origin of costs.

Substantial increase in the number of subscribers

All TAF Group members have noted a substantial annual increase in the number of subscribers. This obliges them to have spare capacity that makes allowance for the long delivery deadlines caused by the absence of a local telecommunication equipment manufacturing industry and the scarcity of own resources for investment. The notion of efficiency must, in these cases, be looked at realistically.

Low cost of labour

The cost of labour, which is very low in most TAF Group countries in comparison with other parts of the world, is likely to rise.

A.4 Approach to cost calculation

Liberalization

While most of the TAF Group countries have embarked on or foresee the liberalization of the telecommunication sector, this is not yet a fact of life; in almost every case States which have ceased to operate telecommunication services have granted the new operator exclusive rights for a specified period of time. As a result, companies have not been encouraged to set up cost-management structures that are not required for the market in which they operate.

For the determination of costs, it is necessary to take account of regional particularities while remaining within the framework of ITU-T D. 140.

A.4.1 EFDC

The TAF model is based *a priori* on enhanced fully distributed costs (EFDC). However, members with a suitable cost accounting system and a high volume of traffic may wish to adopt another approach to the network components whose cost changes with the volume of traffic.

A.4.2 Cost of other activities

In applying the TAF model, costs that are unrelated to the telephone service are neutralized. Those linked directly to the operation of other networks (e.g. telex, data transmission, etc.) are usually easy to single out.

Where costs are shared, they are easily distributed using cost apportionment methodologies such as ABC[3]. Those members (the majority) to whom such methodologies are not available can resort to ad hoc monitoring of representative samples.

Where such monitoring is not possible, costs can be apportioned using various rules of thumb such as the directly attributable share of the cost, proportion of turnover, proportion of the workforce, etc.

A.4.3 Amortization

Amortization is an important cost element. Today, the length of time it takes to write off investment in telecommunication equipment depends more on the equipment's rapid obsolescence than on its theoretical useful life. This state of affairs affects TAF members all the more in that they have no local manufacturing industry.

A ten-year amortization period for telecommunication equipment seems reasonable today.

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[3] ABC: Activity-based costing is an apportionment methodology based on the following mechanism: the cost of a service is the cost of the activities that have to be undertaken to offer that service. The cost of an activity depends on the cost of the resources (material and human) that it consumes.

Members who keep detailed accounts of their fixed assets and can therefore assess each item individually will have no difficulty in making the necessary tariff adjustments.

If the accounts contain aggregate information only, the average amortization period for a given technology (e.g. international transmission) can be estimated by dividing net fixed assets[4] by the annual amortization allowance.

$$\text{Average amortization period} = \frac{\text{Net fixed assets}}{\text{Annual amortization allowance}}$$

Example: Net fixed assets: 876

Desired amortization period: ten years

Annual amortization allowance: 100

Average amortization period: 876/100 = 8.76 years

Corrected amortization allowance: 100 × 8.76 / 10 = 87.6

A.4.4 Current costs

As far as possible, members should try to take into account current costs[5], within the limits set by national tax legislation. By the same token, allowance should be made for currency depreciation when reassessing assets.

Example: An item of equipment is purchased for 10 million in year 0.

The equipment is subject to linear amortization over ten years.

Its market price drops by 8 per cent each year.

The amortization allowance in year 2 will be:

$10\,000\,000 \times (1-0.08)^2/10 =$ 846 400 instead of 1 000 000

Important: To take account of falling currency rates, assets may be reassessed in a stable international currency such as SDRs. The resulting amount is converted into the local currency using the average exchange rate for the year.

When all the costs are expressed in local currency, the amount of the adjustment of current costs can be estimated using the following formula:

$$ACC = AMO \times \left(\frac{(1+\tau)^{D/2}}{(1-\varepsilon)^{D/2}} - 1 \right)$$

where:

ACC adjustment to current costs

AMO amortization allowance

τ average annual growth rate in the price of equipment[6]

ε average annual rate of currency depreciation[7]

D amortization period

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[4] Net fixed assets: Purchase value – aggregate amortization.

[5] Current Cost: What the item would cost were it to be purchased by now.

[6] The rate will be negative if the price falls.

[7] If 1 SDR is worth C_0 in year 0 and C_N in year N, then $\varepsilon = 1 - (C_0/C_n)^{1/N}$. Depreciation is postive when the currency is devalued.

A.4.5 Spare capacity

Members must show that idle capacity is not the result of inefficient management of resources. They must therefore ensure that all available capacity is used within a period compatible with good reorder conditions.

If τ is the compound annual growth rate, K_0 the current capacity, N the appropriate reorder period and ΔK the spare capacity, the amount of idle capacity can be calculated as follows:

$$K' = Max\left(0; \Delta K - K_0 \times \left[\left(1+\tau\right)^N - 1\right]\right)$$

If K' is positive, the corresponding cost share is deducted from the cost of $K_0 + \Delta K$.

If K' is equal to zero, there is no idle capacity.

If there is idle capacity, the corresponding investment cost must be reduced by $K'/(K_0 + \Delta K)$.

For example:

A network has a total capacity of 200.

There are at present 150 subscribers.

The compound annual growth rate in the number of subscribers is 15 per cent.

The reorder period is three years.

Then $K' = Max\left(0; 50 - 150 \times \left[\left(1+0.15\right)^3 - 1\right]\right) = 0$, and there is no idle capacity.

A 5 per cent growth rate would have produced K' = 26.36 and the cost would have to be reduced by 26.36/200 = 13.18 per cent to take account of the idle capacity.

A.4.6 General support activities

Certain costs are related to the company's general activities and cannot be apportioned on the basis of objective criteria of cause and effect to the services offered by the company. They comprise *inter alia* the costs incurred in the following activities:

- top management and related activities;
- human resources management;
- administration of the information management system;
- financial and accounting management;
- general administration, procurement and logistics.

A.4.7 Functional support activities

Other costs concern service-related activities and may be classified as follows:

1) organizing the offer of services;
2) customer access to the offer of services;
3) management of the consumption of services.

The costs arising from those activities comprise *inter alia*:

Category	Activity	Attribution
Organizing the offer of services	Identification of service opportunities and market studies	Services
	Tariffs	Services
	Network and studies development	Networks
Customer access to the offer of services	Management of the distribution circuit	Services
	Advertising	Services
	Network connection	Networks
Management of consumption of services	Technical operation and maintenance	Networks
	Billing and collection	Services
	Business information system	Services

A.4.8 Networks

Operator's network: The operator's network has three parts:

1) transmission infrastructure;
2) switching infrastructure;
3) access infrastructure.

For the purposes of the model, the accounting system should show the costs of the following network elements:

- international transmission;
- national transmission;
- international switching;
- national switching;
- access network.

The cost elements listed below must be taken into account for each of the network elements listed above:

- amortization of investments (telecommunication equipment, buildings, power and auxiliary plant, structural investments);
- reserves for recalculation of assets;
- operating and maintenance costs;
- financial and capital costs;
- taxes and duties on assets.

Third-party networks

If the network operator has signed interconnection agreements with other local operators, the interconnection charges are added to the cost of incoming calls.

A.4.9 Services

A.5 Cost components

Costs attributable directly to services may result from the apportionment of functional support costs.

A.5.1 Direct costs

In accordance with Annex A/D.140, direct costs are those that are directly and unambiguously attributable to the international service. They include:

- the costs of the international network (see A.4.8: Networks);
- business activities relating exclusively to international traffic;
- services provided by third parties in connection with the international service (leases, direct transit, etc.).

A.5.2 Indirect costs

Certain support costs can be identified objectively and charged to the international service. They include:

- processing of traffic data for international accounting purposes;
- keeping the accounts of submarine cable maintenance agreements, where applicable.

A.5.3 Common costs

Common costs are made up of the following elements:

- the costs of investment and of running the operator's national network (see A.4.8: Networks);
- interconnection costs;
- general support costs;
- functional support costs that are not directly attributable to the international service;
- taxes on corporate assets.

A.6 Distribution of costs

A.6.1 Direct costs

Direct costs are attributed directly to the international service.

A.6.2 Common costs

The costs relating to the national network (including interconnection costs) are distributed among the different services in proportion to each service's share of traffic.

General support activity also concerns "other activities" (see A.4.2: Cost of other activities). The "ABC" method applied continuously or by sampling (in time and/or space) could be used to allocate a part of the costs to services; the unallocated part would be apportioned on the most rational basis possible.

The costs of certain functional support activities can be charged to the services, whereas others have to be included among the network element operating and maintenance costs. The "ABC" method applied continuously or by sampling (in time and/or space) could be used to allocate a part of the costs to services; the unallocated part would be apportioned on the most rational basis possible.

Corporate tax costs are distributed among the different services proportionately to each service's share in the company's assets.

A.6.3 Exceptions

The following services are identified in the cost model:

– outgoing international calls;

– incoming international calls;

– local calls;

– trunk calls.

The costs of billing subscribers are not charged to incoming international traffic.

Reserves for international claims are not charged to national traffic or to outgoing international traffic.

Reserves for national claims are not charged to incoming international traffic.

A.7 Data required

The model requires three types of information: traffic data, cost data and management data.

A.7.1 Traffic data

Local traffic

This is the volume of traffic exchanged annually within one locality. *The percentage of local traffic generated in locality(ies) with an international transit exchange must be identified*. In localities with only one switching exchange, all traffic will be local; in those with two or more exchanges, the infrastructure for transmission between local automatic exchanges (local transmission) is included in the access network.

Trunk traffic

This is traffic between different localities using national transmission media. Cross-border traffic is treated as trunk traffic.

Subregional traffic (incoming and outgoing)

This is the traffic exchanged between the national operator's network and the networks of operators in neighbouring countries using national transmission media as far as territorial borders.

International traffic (incoming and outgoing)

This is international traffic routed over transmission infrastructure set aside for international calls. Where international traffic also uses national transmission media, the proportion of the national transmission infrastructure used should be identified.

These traffic figures can be obtained:

a) by processing the call tickets collected in an "ordinary" week at independent routing exchanges (including the CT for incoming international/subregional traffic);

b) by drawing up estimates using a mutually agreed methodology, knowing that subregional and international traffic figures are generally easy to obtain from international transit exchanges.

A.7.2 Cost data

A.7.2.1 Direct costs

• International transmission network.

• International switching network.

The ease (or difficulty) of obtaining information on the costs of these two network elements depends on the accounting system used by the operator. The following should be distinguished under each heading:

– *Amortization*: The amounts to be written off annually are generally determined by the accounting system; where the system does not provide this information, it should be possible to reconstitute investments by consulting the contracts signed. Over and above telecommunication equipment proper, power and auxiliary plant, buildings and other investments should also be taken into account.

– *Recalculation of assets*: Operators may find themselves in one of the following situations:

  1) non-renewal of fully amortized equipment;

  2) amortization in unstable or fluctuating local currency;

  3) inhabitual amortization period;

  4) failure to allow for changes in the market price of equipment.

  For any if these reasons the need may arise to recalculate assets (current cost) and to amortize them over an acceptable period (for example, ten years), using a method that accommodates changes in market prices (for example, a sliding scale).

– *Operational and maintenance costs*: Essentially, these comprise the wage bill and intermediate consumables (including electric power and water, tools and small items of equipment).

– *Capital costs*: Investment may be secured either by putting the company into debt or by raising capital. The expected return on investment and the interest rate on loans should therefore be taken into account when calculating net fixed assets. The operator may determine the overall cost of capital by calculating the following weighted average:

$$CC = Ke\left(\frac{E}{E+D}\right) + Kd(1-t)\left(\frac{D}{E+D}\right)$$

Where:

Ke cost of equity capital

E amount of equity

D amount of debt capital

Kd before tax cost of debt

t tax on company's profit

The cost of capital in absolute terms is obtained by multiplying the net fixed assets by CC. Calculated in this way, the cost of invested capital does not inflate the financial costs.

– *Taxation of assets*: If the operator's assets are taxable annually under the prevailing legal system, the amount of such tax should be included in the annual costs.

• Business activities relating exclusively to international traffic: These are the costs involved in maintaining relations with international correspondents for negotiating settlement and transit rates, international accounts, collection of balances, etc.

• Services provided by third parties in connection with the international service: These include the leasing of international circuits, the negotiation and settlement of charges relating to international maintenance of submarine cables, transit rates, etc.

A.7.2.2 Indirect costs

- Processing of traffic data for international accounting purposes. This set of costs includes:
  1) data collection system (e.g. magnetic tapes and tape decks);
  2) processing software;
  3) a share of computer costs;
  4) a share of human resources;
  5) a share of the intermediate consumables used by the data processing structure.

  Failing a more accurate method, costs may be allocated according to the following rule of thumb: cost elements are shared among the different software programs used by the computer department, and the cost of the international accounting software is taken into account.
- The cost of certain functional support activities, such as the administration of submarine cable maintenance agreements, can be broken down as objectively as possible and charged in part to the international service.
- Members should identify the costs arising form the activities listed in A.4.7 (functional support activities) so that a share of them can be included among the international service costs. Generally speaking, the following approach could be adopted:

Activity	Attribution
Identification of service opportunities and market studies	100% to the national services
Tariffs (tariff studies)	Pro rata to services, on the basis of traffic
Network studies and development	Intangible assets should be distributed among the network components as accurately as possible; in order to update infrastructure costs, the related amortization costs should be reassessed each year, all else being equal, unlike tangible assets
Administration of service sales points	Pro rata to services, on the basis of traffic
Advertising	Pro rata to services, on the basis of traffic
Connection to the network	100% to the access network
Technical operation and maintenance	X% to the national network (after deduction of the international costs referred to under A.7.2.1: Direct costs)
Billing and collection	100% to the national telephone services
Business information system	Pro rata to services, on the basis of traffic

A.7.2.3 Common costs

Common costs comprise national extension network costs, interconnection costs and unattributable support costs.

- National extension: The components to be taken into consideration are:
  1) national switching;
  2) national transmission;
  3) access network.

In each case, the following should be distinguished:

– *Amortization*: The amounts to be written off annually are generally determined by the accounting system; where the system does not provide this information, it should be possible to reconstitute investments by consulting the contracts signed. Over and above telecommunication equipment, proper, power and auxiliary plant, buildings and other investments should also be taken into account.

– *Recalculation of assets*: Operators may find themselves in one of the following situations:

  1) non-renewal of fully amortized equipment;

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  For any of these reasons the need may arise to recalculate assets (current cost) and to amortize them over an acceptable period (for example, ten years), using a method that accommodates changes in market prices (for example, a sliding scale).

– *Operational and maintenance costs*: Essentially, these comprise the wage bill and intermediate consumables (including electric power and water, tools and small items of equipment).

– *Capital costs*: Investment may be secured either by putting the company into debt or by raising capital. The expected return on investment and the interest rate on loans should therefore be taken into account when calculating net fixed assets. The operator may determine the overall cost of capital by calculating the following weighted average:

$$CC = Ke\left(\frac{E}{E+D}\right) + Kd(1-t)\left(\frac{D}{E+D}\right)$$

Where:

Ke cost of equity capital

E amount of equity

D amount of debt capital

Kd before tax cost of debt

t tax on company's profit

The cost of capital in absolute terms is obtained by multiplying the net amortized figure by CC. Calculated in this way, the cost of invested capital does not inflate the financial costs.

– *Taxation of assets*: If the operator's assets are taxable annually under the relevant legal system, the amount of such tax should be included in the annual costs.

• Interconnection charges: If calls carried over the operator's network are to terminate on the networks of other national operators within the same national boundaries, remuneration of such third parties will constitute an extra cost to be added to the access network costs.

• Unattributable support costs: These should be distributed as accurately as possible, a fairly feasible proposition if the operator is using the "ABC" methodology; otherwise, as many of these costs as possible should be allocated as rationally as possible either to functional support activities or to network operation and maintenance activities. Any remaining unallocated costs should be distributed pro rata among the various services, according to the traffic carried.

A.7.3 Management data

a) Installed capacity.

b) Utilized capacity.

c) Annual growth rate of the number of subscribers.

d) Growth rate of infrastructure prices (international transmission, international switching, national transmission, national switching, access network).

e) Expected return on investment.

f) Average interest rate on loans.

g) Amortization period for investment in the various network components.

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