



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Series D

Supplement 1
(11/1988)

SERIES D: GENERAL TARIFF PRINCIPLES

Charging and accounting in international
telecommunications services

Cost and tariff study method

ITU-T D-series Recommendations – Supplement 1

Originally published in Blue Book (1988) – Fascicle II.1

NOTES

- 1 Supplement 1 to the D-series Recommendations was approved in Melbourne (1988) and published in Fascicle II.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).
- 2 In this Supplement, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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COST AND TARIFF STUDY METHOD

(At the present time this method is applicable only to the countries in Europe and the Mediterranean Basin)

1 Introduction

1.1 In the past, before 1970, the CCITT made a number of studies of international telephone and telex service costs. Those studies usually referred, however, only to parts of the services and the Recommendations prepared on the subject of tariffs applied only to the European region. Those Recommendations were based on the principle that, in a given relation, the accounting rate consisted of terminal and transit shares which were the same for all the routes used. When a detour was used, the hypothetical terminal and transit shares had therefore to be reduced proportionally. The collection charges corresponded more or less to the amounts of the accounting rates converted into national currencies.

1.2 Between 1964 and 1968, a new philosophy based on a commercial principle was worked out. Recommendation D.150, adopted by the IVth Plenary Assembly of the CCITT (1968), made a clear distinction between the accounting rate and the collection charge. The accounting rate was regarded as a matter to be settled between Administrations, each Administration being reimbursed according to the cost of the equipment it made available. The fixing of collection charges became, within certain limits, a national matter. Each terminal Administration was expected to fix a collection charge in such a way that it covered at least the average of the accounting rates applicable to the various routes used.

1.3 In order to put this new conception into practice, it was necessary to undertake detailed cost studies for the technical facilities and the work involved in setting up telephone and telex calls, in sending telegrams, and in establishing sound-programme and television transmissions in the international service. For that purpose the IVth Plenary Assembly of the CCITT decided to set up four regional tariff groups, namely:

- the TAF Group for the African Region,
- the TAL Group for the Latin American Region,
- the TAS Group for the Asia and Oceania Region,
- the TEUREM Group for the Region of Europe and the Mediterranean Basin.

2 Methods used for establishing tariffs

In carrying out their task, the Tariff Groups used either a simple and purely pragmatic method, called the *synthetic method*, or a complex method, based on cost studies, called the *analytic method*.

2.1 Synthetic method

2.1.1 When the Administrations in a region do not have the necessary data for calculating the costs of the technical facilities and the work involved in the provision of their services (for example, when they do not have an analytical cost accounting system), or when they decide for other reasons not to make a detailed study, a Tariff Group can confine itself to making a synthesis of the tariffs applied by the various Administrations in its region. On the basis of this synthesis, the group establishes, by charging zone, a scale of overall rates for international accounting and, where appropriate, for establishing collection charges in national currencies. The overall charge used for international accounting is called the *accounting income*. It is normally shared between the Administrations of the terminal countries on a 50-50 basis. If, however, the facilities made available by the two terminal countries are not more or less equivalent, a proportion other than 50-50 may be adopted. In principle, the Administration of each terminal country pays a suitable share (normally half) of the remuneration, if any, due to the Administrations of the transit countries.

2.1.2 It is obvious that this synthetic method does not solve the fundamental problems of rate-fixing. It is incapable of establishing a rate for a service a priori, on a theoretical basis, but only a posteriori, on the basis of experience.

2.2 *Analytic method*

2.2.1 When the Administrations of a region are in a position to analyze the costs involved in the provision of a given service (amortization, financial charges, labour costs, cost of consumable materials for maintenance, taxes, costs of the services provided by third persons), a Tariff Group normally uses the so-called *analytic* method. This consists in laying down – on a rational basis and, in particular, on the basis of cost studies – standards for the fair remuneration of the various facilities made available by an Administration in providing a given service (telephone or telex call, telegram, etc.). For calculating costs, Administrations usually possess data derived from an analytical cost accounting system, which they supplement, as required, with more detailed studies and data provided by statistics.

2.2.2 By means of a questionnaire, the Tariff Group collects the data obtained by the Administrations in its region, synthesizes them, calculates average costs taking account of the special conditions prevailing in the various countries, and determines the standards to be recommended for remunerating the facilities made available by Administrations in international telecommunications services. These standards can then be used by the Administrations in the region in fixing their accounting shares for purposes of international accounting, their accounting rates and, hence, their collection charges. They take account not only of actual costs, but also of criteria recommended by the CCITT for rate-fixing purposes (e.g., the concept of services rendered).

2.2.3 The standards recommended for determining accounting rates are used for remunerating the Administrations of the terminal and transit countries by the so called *flat-rate price* or *traffic unit price* methods, explained in the relevant CCITT Recommendations.

It is only by the analytic method, therefore, that all the requirements of rate fixing can be met. This is the method traditionally used by the CCITT.

3 **Cost studies**

3.1 *General*

3.1.1 To carry out a detailed tariff study in international telecommunications services, a Tariff Group must know the cost of the services supplied by the Administrations and the factors affecting the provision of these services. The Tariff Group must therefore collect the detailed data from the Administrations in its region, synthesize them, calculate the average costs of the various factors and determine the standards to be adopted in remunerating the facilities made available by Administrations in providing a service in the international telecommunications services. Administrations must, of course, be assured that the data collected are treated absolutely confidentially.

3.1.2 The numerical data provided by Administrations should be expressed in a universally recognized currency. For this purpose, it is desirable to use the monetary units mentioned in Article 30 of the International Telecommunication Convention (Nairobi, 1982), i.e. either the monetary unit of the International Monetary Fund which is at present the special drawing right (SDR), or the gold-franc (G.Fr.).

In the event that the same monetary unit is not used by all Administrations, the Tariff Group should:

- a) choose the monetary unit in which costs are calculated and present the results. The monetary unit used by the majority of Administrations having responded to the questionnaire will generally be used. Data given in the other monetary unit will be converted into the unit adopted by the Tariff Group;
- b) convert the tariff standards established in the chosen monetary unit into the other monetary unit used by the minority of Administrations. For the conversion from SDR to G.Fr. or vice-versa, the Tariff Group shall use the conversion rate recommended in Recommendation D.195 and in the International Telecommunication Regulations adopted by the World Administrative Telegraph and Telephone Conference, 1988, i.e. 1 SDR = 3.061 G.Fr. or 1 G.Fr. = 1/3.061 SDR.

In view of the problems which may arise in rounding off the values obtained, Appendix I indicates the methodology used by the TEUREM Group to convert into SDR the tariff standards calculated in G.Fr. This methodology can also be used to convert from SDR to G.Fr.

3.1.3 The numerical data provided by Administrations should refer to the same reference year. The Tariff Group must bring them up to date for the period during which the tariffs will be applied. For this purpose the average annual variations of unit prices are taken into account, i.e. possible price increases due to inflation and reductions obtained through technical improvements or the more efficient use of facilities. In determining tariff standards, account will also be taken of a rate of interest sufficiently high to ensure the expected return on the invested capital and of the existing standby facilities made available by Administrations.

3.1.4 The values adopted by the Tariff Group are not “averages” in the strict mathematical sense, but represent values which are generally acceptable for all the countries concerned in the region. The determination of “acceptable” or “reasonable” values thus involves a considerable element of judgement and approximation.

3.2 *Working method*

In making cost studies and establishing tariff standards to be applied for paying for the facilities made available by Administrations in supplying services to users of the international telecommunication services, Tariff Groups generally use the method described below.

3.2.1 *Preparation of a questionnaire*

3.2.1.1 A detailed questionnaire is prepared for the service in question, namely for:

- the telephone service,
- the telex service,
- the public telegram service, or
- sound-programme and television transmissions, etc.

The questionnaire first refers to the *international* part of relations. If necessary, a special questionnaire may be drawn up to collect data referring to the *national extension*, i.e. that part of the connection linking the international centre with the national centres to which users' stations are connected.

3.2.1.2 Each questionnaire is divided, according to need, into several *parts* and *chapters*.

- i) *Division into parts* according to the functions performed or other criteria such as:
 - general information,
 - transmission,
 - switching and operation,
 - national extension (for the case where a separate study is not carried out).
- ii) *Division into chapters* according to accounting or statistical criteria, such as:
 - investment costs,
 - annual charges (capital charges, maintenance costs, building costs, operational costs),
 - statistical information.

3.2.1.3 *Comments*

The telephone service and the telex service are, in many respects, extremely similar, even if the service supplied is different. There are, therefore, many resemblances between cost studies of these two services. The same applies, though to a lesser extent, to studies of sound-programme and television transmissions.

On the other hand, the public telegram service is, by its very nature, very different from the two above-mentioned services, primarily because it involves the handing in and delivery of telegrams, operations which usually call for the employment of considerable numbers of staff. Cost studies of this service therefore involve a number of specific characteristics.

For the “transmission” part, the same questionnaire (usually that for the telephone service) can be used for the various services (telephone, telex, sound-programme transmissions) for determining the costs:

- of a supermastergroup,
- of a mastergroup,
- of a supergroup,

- of a group,
- of a carrier telephone circuit, or
- of a voice-frequency telegraphy channel.

An example of the type of questions included is given in Annex A.

3.2.2 *Circulation of questionnaires and collection of data*

The questionnaires are circulated by the CCITT Secretariat to all Administrations in the region. The Administrations are invited to complete them as accurately as possible and return them to the CCITT Secretariat by a given date. It is unquestionably a delicate and difficult task for Administrations to prepare replies to these questionnaires, because the data are not always immediately available in the required form or presentation; research is, therefore, usually necessary to extract them from accounting and statistical documents and calculations are often required.

3.2.3 *Analysis of the replies and presentation of the results*

The CCITT Secretariat analyzes the replies provided by Administrations and presents the numerical data *anonymously* in the form of tables.

Tariff Group meetings make an itemized examination of the analysis results of each of the items in the questionnaires, and for each item a standard reply is formed. These standard replies constitute the basic data for the cost study.

A whole series of detailed calculations are made on the basis of the data thus arrived at. The model tables given in Annex B, used for recording the results of calculations, give an idea of the procedure followed, the order in which the data are considered and the sequence of calculations carried out.

The result of this procedure is the establishment of costs, standards of remuneration to be applied between Administrations and accounting rates for the various facilities made available and the services provided to users in the international telecommunication services, e.g.:

- per supermastergroup, mastergroup, supergroup or group of circuits;
- per telephone, telegraph, sound-programme, etc. circuit;
- per minute of telephone, telex, etc. call; or
- per word of a telegram.

The standards thus determined are included in the CCITT Recommendations applicable at the regional level.

3.3 *Analysis of certain problems relating to cost studies*

3.3.1 *Methods for calculating average costs*

According to the nature of the services provided by the Administrations, it is recommended that one of the methods described below be used to calculate the average costs for a region.

3.3.1.1 *Comparison by analytical costs*

In determining the average cost of the *international part* of a service provided (charges relating to technical equipment used exclusively for the international service and operating costs), it is customary to compare the *detailed numerical data* provided by the Administrations.

These numerical data refer to:

- investment costs,
- maintenance costs,
- building costs,
- operating costs.

The aim of the study being to calculate, for a given year, the average annual charges of the equipment made available and the average costs per traffic unit (for example per minute of telephone call), the procedure described below should be followed.

3.3.1.1.1 *Investment costs*

First, the average investment costs are calculated per given unit or element on the basis of the numerical data supplied by Administrations for the reference year (for example, per 100 km of actual length of an installed supergroup). Next, the investment cost is calculated for equipment *in service* in the form established and for the year in which the tariff rates are to be applied. To obtain these results, coefficients are applied bearing in mind:

- standbys (installed apparatus/apparatus in service),
- price increases (annual variation rates),
- composition of the standard network (relative importance of coaxial cables, radio-relay links, etc.),
- the ratio: actual length/crowflight distance of the transmission facilities.

3.3.1.1.2 *Financial charges*

The average investment costs are used to calculate the annual *financial charges* per piece of equipment in service, on the basis of the weighted average life assumed for this equipment and the interest rate assumed for remunerating invested capital. For this purpose the “Table giving amortization coefficients as a function of amortization period and interest rate”, contained in Annex C, is used. These annual charges are generally called “capital charges” or “financial charges”.

3.3.1.1.3 *Maintenance costs*

The average annual maintenance costs are calculated per given unit or element (installed circuit or group of circuits) on the basis of numerical data supplied by the Administrations for the reference year. If Administrations cannot specify actual amounts, agreement is reached on a percentage to be applied to the investment cost to calculate the annual maintenance costs.

The annual maintenance costs are then calculated per equipment *in service* in the form established and for the year in which the tariff rates are to be applied, following the procedure described in “Investment costs”.

In evaluating maintenance costs, particular account should be taken of the following types of cost: staffing and labour, consumable materials, electricity and transport.

3.3.1.1.4 *Building costs*

Since some premises either belong to or are rented by the Administrations and equipment is generally installed in premises together with other equipment or services, building costs are usually calculated in the form of an *annual rental*. Exceptions to this rule are buildings which essentially have one purpose only, for example, radio-relay stations. In cases such as these, buildings are included in investment costs.

Annual building costs per piece of equipment *in service*, in the form established and for the year in which the tariff rates are to be applied, are calculated in the same way as annual maintenance costs.

3.3.1.1.5 *Operation costs*

For the purpose of cost studies, the only expenses considered as operation costs are the costs of the staff responsible for the setting up of calls, the international information service, the processing of telegrams, etc. Operation costs also include supervisory and senior staff. Overheads are included in these expenses.

With regard to the telephone and telex services, operation costs are calculated per circuit in service per year.

Average operation costs are determined on the basis of numerical data supplied by the Administrations for the reference year. They are brought up to date to correspond to the period in which the tariff rates are to be introduced by applying an increase coefficient to take account of the increase in salaries during the period in question, i.e. the annual variation rate in the total wage bill.