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SERIES D: GENERAL TARIFF PRINCIPLES

General tariff principles – Tariff principles applying to data communication services over dedicated public data networks

Accounting and settlement principles applicable to the provision of public directory services between interconnected Directory Management Domains

ITU-T Recommendation D.37

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION D.37

ACCOUNTING AND SETTLEMENT PRINCIPLES APPLICABLE TO THE PROVISION OF PUBLIC DIRECTORY SERVICES BETWEEN INTERCONNECTED DIRECTORY MANAGEMENT DOMAINS

Source

ITU-T Recommendation D.37 was prepared by ITU-T Study Group 3 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 1st of July 1996.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The 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 Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

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.

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Recommendation D.37

ACCOUNTING AND SETTLEMENT PRINCIPLES APPLICABLE TO THE PROVISION OF PUBLIC DIRECTORY SERVICES BETWEEN INTERCONNECTED DIRECTORY MANAGEMENT DOMAINS

(Geneva, 1996)

1 Scope

This Recommendation is intended to provide the general accounting and settlement principles applicable to Public Directory Services¹ between interconnected Directory Management Domains (DMDs). In this context, a DMD is defined to be a collection of Directory System Agents (DSAs) and Directory User Agents (DUAs) managed by a single Domain Management Organization (DMO). The F.500 and X.500 Recommendations distinguish between two types of DMOs, administration and private organizations, and the two corresponding types of DMDs, Administration DMDs (ADDMDs) and Private DMDs (PRDMDs), respectively. The distinction between these two types of DMDs is that the former provides public directory services while the latter typically does not.

This Recommendation seeks to provide simplicity in accounting and settlements. While the information detailed in this Recommendation provides guidelines for the DMOs, the specific details of each particular arrangement between DMOs is the subject of bilateral agreements.

2 Introduction

This Recommendation is intended for use by DMOs which provide international directory services. This Recommendation provides a basic set of guidelines for directory service providers. In practice, some service providers may offer a complex range of services which may require more elaborate settlement agreements with other parties. Such special service arrangements are currently outside the scope of this Recommendation.

The following clauses outline the service model used in the settlement process, different types of principles for accounting and settlements, recommended accounting models and formulae, and the accounting elements included in the settlement process.

3 Service model

The Public Directory Service provides the means by which a user of, or a subscriber to, a telecommunications service may obtain information about objects of interest as described in Recommendation F.500 or E.115. The service will be realized through interconnection of individual directory systems. Currently, this Recommendation does not address issues related to accounting and settlements processes between F.500- and E.115-compliant DMDs.

A model for the Public Directory Service is shown in Figure 1.

¹ "Public Directory Services" includes Directory Assistance.

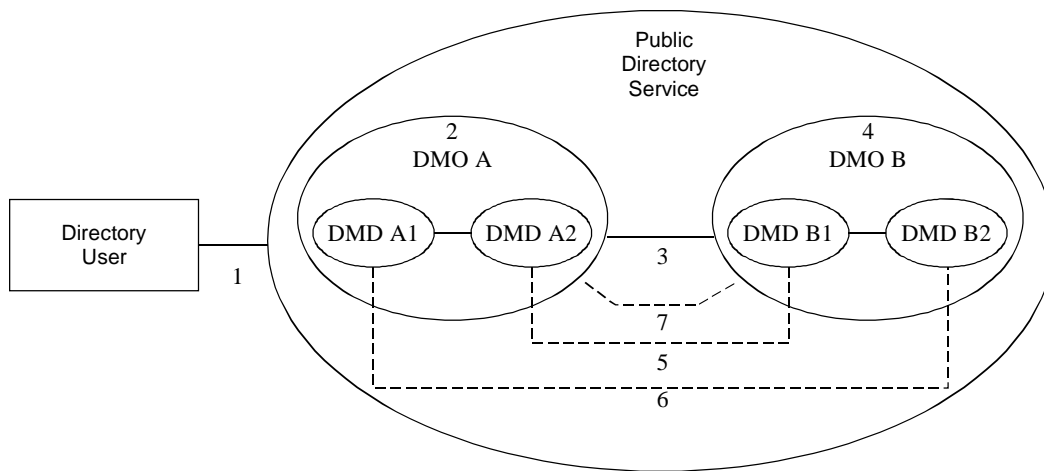


FIGURE 1/D.37

Public directory service model

Table 1 contains definitions of the cost elements illustrated above:

TABLE 1/D.37

Public directory service cost element definitions

Cost element	Definition
1	Directory Access Costs
2	DMO A Operations Costs
3	Inter-DMO Transport Costs
4	DMO B Operations Costs
5	Bilateral Resource Consumption Costs between DMD A2 and DMD B1
6	Bilateral Resource Consumption Costs between DMD A1 and DMD B2
7	Bilateral Resource Consumption Costs between DMO A and DMO B

Each DMO will determine how it provides access to the Public Directory Service for its customers or directory users. Thus, in Figure 1, the costs of providing directory access (1), and of the operations (2 and 4) performed within DMOs for those customers, are the responsibility of DMO A and DMO B, respectively, and are outside the scope of this Recommendation.

The inter-DMO transport costs (3) associated with transferring directory information between DMOs tend to be addressed by arrangements outside the scope of this Recommendation. The focus of this Recommendation is the accounting and settlement for services performed by other DMOs (7) to supply directory information to DMDs to satisfy customer requests. Although any cost settlement activities will be negotiated on a bilateral basis between DMOs, if a DMO has more than one DMD, separate bilateral agreements can, but do not have to be, negotiated with a particular pair of DMDs (5,6).

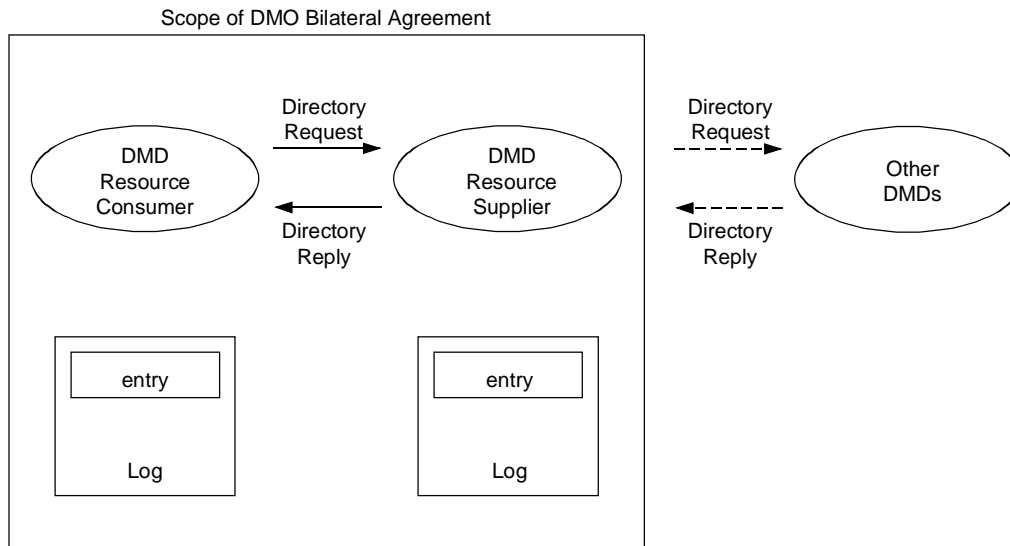
Additional information describing the Public Directory Service is contained in Recommendation F.500 for X.500-based DMOs and in Recommendations E.115 and E.104 for DMOs that provide Public Directory Assistance Service.

4 Accounting model

This clause defines the recommended accounting model. The model may optionally be used by DMOs in the establishment of bilateral agreements.

A DMD accepts Directory System Protocol (DSP) requests from other DMDs and assumes the role in the model of a DMD resource supplier. A DMD that submits DSP requests to a DMD resource supplier assumes the role of a DMD resource consumer.

The entities involved in the model are depicted in Figure 2.



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FIGURE 2/D.37

Public directory services accounting model

The focus of these bilateral agreements is the accounting between a pair of DMOs that own and operate the DMDs highlighted by the box shown in Figure 2. The "Other DMDs" may act as a resource supplier to requests from the "DMD Resource Supplier". A common example is when the "DMD Resource Supplier" chains a directory request to another DMD. In that case, the "DMD Resource Supplier" is acting as resource consumer within the context of interaction with DMDs that are not within the scope of the bilateral agreement as shown within the box in Figure 2, but may be subject to a separate bilateral agreement. The log entries shown in Figure 2 identify the consumer and supplier of the request and records all the information regarding the request that is relevant for charge computation and subsequent settlement.

4.1 Statement of limitation

The accounting model is a framework for the simple, overall approximation of the elements of cost one DMO incurs when accepting and processing a directory request from another DMO. This approach is to achieve a workable and acceptable set of procedures for accounting and subsequent settlement, rather than attempt to cost each individual transaction element.

4.2 DMOs and resource usage recording

In processing DSP or E.115 requests, the DMD resource supplier makes use of the resources within its domain and may, depending on the request, use additional resources and incur additional costs to interact with other DMDs. To establish a mutually verifiable record of a directory request and associated processing, both the DMD resource consumer and supplier maintain a log entry of each request transmitted from the consumer to the supplier. This log entry identifies the consumer and supplier of the request and records all the information regarding the request that is relevant for cost computation and subsequent settlement.

4.3 Accounting elements

The accounting elements in the model reflect factors entering into the accrual of the actual cost of DSP or E.115 request processing in a simple and approximate manner. The only accounting elements considered in the model are those elements contained in the DSP or E.115 transactions between the resource supplier and consumer. The specific accounting elements identified as relevant to accounting and subsequent settlement are described in clause 5. Inclusion of additional accounting elements is for further study.

4.4 Settlement formula

In the accounting model, the settlement due the DMD resource supplier in processing the requests of the DMD resource consumer is the sum of the individual accounting elements recorded by the consumer and supplier in their log entries for the requests. The settlement due the supplier in processing requests from the consumer during an interval of the time over which settlement occurs can be computed as:

$$S = \sum r_i a_i$$

where:

- S is the settlement amount due the supplier in the settlement period;
- i is the index for the set of accounting elements described in clause 5;
- a_i is the total number of occurrences of accounting element i during the settlement period;
- r_i is a bilateral agreed upon rate applied to the accounting element total a_i ;
- Σ indicates that all occurrences of valid accounting element and rate combinations are added.

5 Accounting elements for settlement

The accounting elements for settlement purposes fall into two major categories: directory requests and results returned. For DMOs using E.115 to exchange directory information, only these two accounting elements will be tracked. The billable transactions will be defined by bilateral agreement on the basis of the type of Message Codes received.

DMOs using DSP to exchange directory information will log accounting elements at a more detailed level as described in 5.1 and 5.2.

5.1 DSP directory requests

Since each operation requested may involve different supplier costs to perform the operation, totals should be accumulated by request type. The following list identifies the types of requests which may be differentiated:

ADD ENTRY;
COMPARE;
LIST ENTRIES;
MODIFY ENTRY;
MODIFY RDN;
READ ENTRY;
REMOVE ENTRY;
SEARCH BASE OBJECT;
SEARCH IMMEDIATE SUBORDINATES;
SEARCH SUBTREE.

Although it is anticipated that requests that modify directory entries (ADD, MODIFY, REMOVE) are unlikely to occur across DMO boundaries for cost, security, and business reasons, they are included for completeness. Settlement rates for these requests, or any request in the list, may be set to zero. Also, other DSP requests such as BIND, UNBIND, and ABANDON, are purposely not included. Accounting for these operations is assumed to be included in the rate associated with the above operations. The inclusion of other accounting elements for additional operations may be the subject of further study.

5.2 DSP results returned

All results returned to a DSA in response to requests are to be counted during a settlement period. The total should include Directory Entries, Referrals, and Partial Outcome Qualifiers. Requests which exceed service limits, but nevertheless return some entries, will have those results counted.

6 Accounting and settlement arrangements

Both parties may enter into a reciprocal arrangement whereby they bilaterally agree to dispense with international accounting and settlement.

Subclauses 6.1 and 6.2 contain descriptions of accounting and settlement arrangements which may be used by parties when it is mutually agreed that accounting and settlement are appropriate.

6.1 Net Balance settlement

This type of bilateral agreement requires the establishment of accounting and settlements principles. The words "Net Balance", in this context, means that settlements flow in the direction of the DMO consuming less of its partner DMO's resources. Typically, this type of agreement will include accounting principles that allow for accumulation of resource usage charges with periodic resets to zero when settlement occurs.

6.2 Transaction-Based settlement

This type of bilateral agreement also requires the establishment of accounting and settlements principles. The word "Transaction-Based", in this context, means that there is a bidirectional flow of transaction settlements between consuming and supplying DMOs. Typically, this type of agreement will include accounting principles that allow for recording of real-time or near real-time resource usage.

7 Principles of accounting and settlement

7.1 Principles for Net Balance Settlement Arrangements

7.1.1 Accounting principles

7.1.1.1 In general, accounting procedures for Net Balance Settlement Arrangements should be such that the consumer DMO requesting information (on behalf of a user) and the resource supplier DMO providing directory information can readily record and verify the accuracy of the accounting.

7.1.1.2 The resource supplier DMO is responsible for collecting the service data and presenting the statement of accounts. The resource consumer DMO may wish to produce its own version of the same information for reconciliation purposes.

7.1.2 Settlement principles

7.1.2.1 This settlement process is intended to allow DMOs to recover the cost of providing Directory Services to other DMOs **in the aggregate**.

7.1.2.2 A uniform formula for all settlement is provided, but the rates and accounting elements (see clause 5) will be separately established in each bilateral agreement.

7.1.2.3 Settlement agreements may have different component rates for accounting elements in each direction.

7.2 Principles for Transaction-Based Settlement Arrangements

7.2.1 Accounting principles

7.2.1.1 In general, accounting procedures for Transaction-Based Settlement Arrangements should be such that the resource consumer DMO requesting information (on behalf of a user) and the resource supplier DMO providing directory information can readily record and verify the accuracy of the accounting.

7.2.1.2 The resource supplier DMO is responsible for collecting the service data and presenting the statement of accounts. The resource consumer DMO may wish to produce its own version of the same information for reconciliation purposes.

7.2.2 Settlement principles

7.2.2.1 This type of settlement process is intended to allow DMOs to recover the cost of providing Directory Services to other DMOs **for each specific request**.

7.2.2.2 A uniform formula for all settlement is provided, but the rates and accounting elements (see clause 5) will be separately established in each bilateral agreement.

7.2.2.3 Settlement agreements may have different component rates for accounting elements in each direction.

8 Reverse charging

This area is for further study.

9 Glossary of terms

9.1 accounting element: Is an item of information describing some aspect of a directory service request transmitted between a DMD consumer and DMD supplier. Thus directory service requests and the resulting directory entries returned by the DMD supplier are included as accounting elements.

9.2 domain management organization (DMO): A Domain Management Organization is an administration, ROA, or private organization managing one or more DMDs.

9.3 directory management domain (DMD): A Directory Management Domain is a collection of DSAs managed by one administration, ROA, or private organization.

9.4 DMD resource consumer: Is a Directory Management Domain transmitting a DSP request to another DMD in order to satisfy a directory service request.

9.5 DMD resource supplier: Is a Directory Management Domain supplying directory information in response to a DSP request from another DMD.

9.6 directory system agent (DSA): A Directory System Agent is responsible for maintaining Directory information and performing Directory Service functions. One or more DSAs cooperate to give users a single view of the Directory. Each DSA holds a fragment of the Directory Information Base.

9.7 directory system protocol (DSP): The Directory System Protocol is used for Directory interactions between Directory System Agents. The DSP allows the Directory Service to be distributed across multiple DSAs.

9.8 relative distinguished name (RDN): Relative Distinguished Name. The unique name of an entry. It consists of a particular sequence of attribute value assertions, each of which is true, concerning the distinguished values of an entry.

9.9 object (of interest): Anything in some "world", generally the world of telecommunications and information processing or some part thereof, which is identifiable (can be named), which is of interest to hold information on the Directory Information Base.

9.10 partial outcome qualifier: This is used to signal incomplete LIST and SEARCH results. For Recommendation E.115, this is signalled by Message Codes.

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