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CHARGING AND ACCOUNTING IN INTERNATIONAL TELECOMMUNICATION SERVICES

GENERAL ACCOUNTING PRINCIPLES APPLICABLE TO MESSAGE HANDLING SERVICES AND ASSOCIATED APPLICATIONS

ITU-T Recommendation D.36

(Previously "CCITT Recommendation")

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (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).

ITU-T Recommendation D.36 was revised by ITU-T Study Group 3 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 20th of March 1995.

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NOTE

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

CONTENTS

GENERAL ACCOUNTING PRINCIPLES APPLICABLE TO MESSAGE HANDLING SERVICES AND ASSOCIATED APPLICATIONS

(Revised in 1995)

1   Scope

This Recommendation is intended to provide the general accounting principles applicable to message handling services (as described in the F.400- and X.400-Series of Recommendations) and associated applications between interconnected Administration Management Domains (ADMDs). While the information detailed in this Recommendation provides guidelines for the parties concerned, the specific details of each particular accounting arrangement between ADMDs is the subject of bilateral agreements between those ADMDs and may vary from this Recommendation.

2   Introduction

2.1   This Recommendation is intended for use by ADMDs which provide message handling services and associated applications. It should also be of use to organizations creating software for the accounting and settlement of such services. It strives to strike a balance between simplicity and accuracy in accounting. An additional objective is to aid the provision of cost effective and reliable services between interconnected ADMDs.

2.2   The following subclauses lay out the overall model of ADMD interconnection, accounting principles useful for these interconnections, and formulas for various service interactions from the service providers' point of view. Annexes are provided for abbreviations and a glossary, and proposed account statements.

2.3   This Recommendation should be applied in conjunction with other relevant ITU-T Recommendations.

3   Service aspects

3.1   Message handling services provided via ADMDs comprise the offerings of the public service providers and are based on Recommendations laid down in the F.400- and X.400-Series of the ITU-T. The versions of 1988 are the primary reference, but appropriate attention has been given to the 1984 versions. The F.400-Series of ITU-T Recommendations are to be taken into account as far as applicable.

3.2   Regional profile standards should be used for reference and are applicable as far as their specifications are compatible with this Recommendation.

4   General model for accounting

4.1   General definition

In order to establish a reference basis to permit a clear definition of principles for accounting, this subclause sets out a general model in which the cost elements to be taken into consideration are identified. These cost elements encompass the network features corresponding to OSI layer 3 and features of implementation relating up to and including OSI layer 7.

4.2   Presentation of the model

This model depicts the various interactions and processing involved in message handling.

Each interaction and process is associated with a cost element. These cost elements are identified in Figure 1 and their associated accounting principles in clause 5.
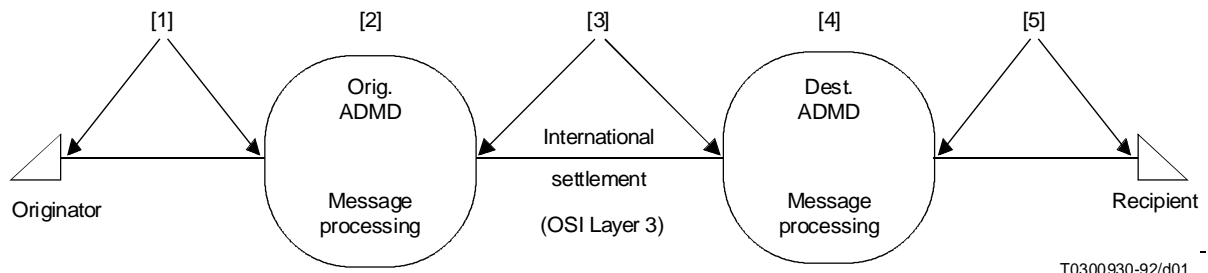
[1]   Service access costs.

[2]   Processing costs at the originating ADMD.

[3]   Network costs between ADMDs.

[4]   Processing costs at the destination ADMD.

[5]   Delivery costs which may involve delivery to UAs, delivery to other telecommunication
        and physical delivery services, transfer to PRMDs and transfer to other ADMDs.

FIGURE 1/D.36

Cost elements model

5   Principles for accounting

5.1   Assumptions

Accounting principles to be applied internationally are based on the following assumptions.

5.1.1   They shall apply for all appropriate situations that face public service providers operating ADMDs.

5.1.2   Bilateral agreements are assumed for the component rates (see glossary in Annex B) used for the traffic relation concerned.

5.1.3   The principles shall allow for flexibility regarding the range of agreements.

5.2   General principles

5.2.1   Due to the adverse impact on the accounting and settlement process, the originating ADMD will not knowingly allow traffic to be passed to the destination ADMD where such traffic is outside the bilateral agreement.

5.2.2   Similarly, the destination ADMD may bar traffic from a specific originating ADMD where such traffic is not covered by a bilateral agreement.

5.2.3   All messages transferred to the destination ADMD should be subject to accounting, even if a message cannot be delivered to the intended recipient.

Otherwise, accounting and settlement may not be required if the originating and terminating ADMDs have agreed by bilateral agreement that the originator will be charged for originating a message and the recipient will be charged at the destination ADMD for receipt of the message.

5.2.4   Delivery service offerings across an ADMD to ADMD interconnection may be different in each direction and have their own outpayment rate.

5.2.5 Component rates due to an ADMD for equivalent services across an ADMD to ADMD interconnection are not required to be symmetrical.

5.2.6 In general, accounting procedures should be such that the originating ADMD can easily comprehend the resulting accounting before transmission.

5.2.7 Unless otherwise agreed, rates are expressed in SDRs (Special Drawing Rights).

5.2.8 For accounting arrangements covered by this Recommendation service messages may, by bilateral agreement, be excluded from the accounting statements.

5.2.9 In general, the originating ADMD is responsible for collecting the data and presenting the statement of accounts. (A suggested format for an account statement can be found in Annex D.) The receiving ADMD, as appropriate, may wish to produce the same information for reconciliation purposes.

5.2.10 For messages which are delivered via access units and/or distribution lists, two methods of accounting are recognized: one based on estimated accounting information, and one based on exact accounting information. The method used is subject to bilateral agreement, but it is noted that, while preferable, the use of the latter method is not feasible until a cost-effective, exact accounting methodology based on per-message information becomes available.

5.2.11 In the Message Handling Services reverse charging may be applied independent of content type by bilateral agreement. For reverse charged messages, the destination ADMD is responsible for collecting the data required under the formula set out in subclause 6.3 and shall present a statement of accounts to the originating ADMD.

5.2.12 Potential variable costs incurred by multi-national ADMDs should be considered in bilateral negotiations between ADMDs.

5.2.13 The potential variable costs incurred in handling large file transfers, e.g. with voice messaging, should be considered in bilateral negotiations between ADMDs. Such variable costs may include lower per octet processing costs and potentially higher storage costs at the destination ADMD, for large file transfers.

5.3 Accounting for specific cost elements

5.3.1 Originator charged

Accounting for specific cost elements as illustrated in the model (Figure 1), where the originator is charged, is assumed as follows.

5.3.1.1 Service access costs (service cost element [1]) are a national matter and are not included in the accounting.

5.3.1.2 Processing costs at the originating ADMD (service cost element [2]) are a national matter and are not included in the accounting.

5.3.1.3 Network costs between ADMDs (service cost element [3]) are to be addressed by normal accounting arrangements covering the networks involved, except where transit ADMDs are involved. See 5.4.8.

5.3.1.4 Processing costs at the destination ADMD (service cost element [4]) should be subject to accounting.

5.3.1.5 Delivery costs (service cost element [5]) may be subject to accounting.

5.3.2 Reverse charging

Accounting for specific cost elements as illustrated in the model (Figure 1), where reverse charging is applied, is assumed as follows.

5.3.2.1 Service access costs (service cost element [1]) cannot be determined on a per-message basis by the destination ADMD. (The origin ADMD will of course be able to determine such costs and therefore will include them in its composite rate.) Network costs between ADMDs (service cost element [3]) will continue to be incurred by the originating ADMD. Accordingly service cost elements [1] and [3] should be combined with service cost element [2] by the originating ADMD in a single composite rate as set out in 6.3.

5.3.2.2 Processing costs at the destination ADMD (service cost element [4]) are a national matter and are not included in the accounting.

5.3.2.3 Delivery costs (service cost element [5]) are a national matter and are not included in the accounting.

5.3.3 Single space ADMD values

Any additional costs borne by the destination ADMD for delivery of messages to PRMDs which use the single space ADMD value, will be included in the D' transfer rate per octet for delivery to PRMDs (see formula in 6.1).

5.4 Service specific principles

5.4.1 Optional user facilities

5.4.1.1 Optional user facilities invoked by the originator or originating ADMD that imply the use of resources at the destination ADMD may be subject to accounting.

5.4.1.2 Optional user facilities selected by the intended recipient are, for accounting purposes, the responsibility of the recipient ADMD.

5.4.1.3 Notifications for messages sent paid

The inclusion of delivery notifications in inter-ADMD accounting is subject to bilateral agreement.

Non-delivery notifications are not normally included in the inter-ADMD accounting. However, the exceptional case is noted in 5.4.1.7 below.

Application based notifications should be accounted for on a reversed charged basis, i.e. the destination ADMD which is providing the notification will be remunerated by the originating ADMD which is responsible for the notification request associated with the original message.

However, in the absence of appropriate technical means in both the originating and destination ADMDs to distinguish such notifications from messages, the accounting should be the same as for messages.

5.4.1.4 Notifications in reverse charging

The inclusion of delivery notifications in inter-ADMD accounting is subject to bilateral agreement.

Non-delivery notifications are not included in the inter-ADMD accounting.

Application based notifications in reverse charging are included in the accounting as messages. Since the recipient agrees to accept all charges associated with a reverse charged message, notifications will be charged to the recipient of the message and accounting and settlement for the original message and the notification will be effected by the destination ADMD.

5.4.1.5 Probe

A probe is included in the accounting as a message.

5.4.1.6 Conversion

The cost of explicit or implicit conversion is included in the delivery rate.

Conditions for other types of conversion are subject to bilateral agreement.

5.4.1.7 Return of contents

Because of the impact on accounting, the support of the return of contents optional user facility between ADMDs is not advised. However, where, by bilateral agreement, ADMDs do support return of contents, the non-delivery notification with return of contents should be accounted for on a reverse charged basis, i.e. the destination ADMD which is sending the notification will be remunerated by the origin ADMD, which is, in fact, responsible for the notification request associated with the original message.

5.4.1.8 Originator requested alternate recipient

Depending on the O/R address of primary and alternate recipients, the originating domain may be unable to determine the delivery cost. Thus, the destination domain decides whether delivery to the specified alternate recipient is effected. The use of this facility is subject to bilateral agreement.

5.4.1.9 Distribution Lists (DLs)

The owner of the DL is responsible for all messaging charges resulting from the use of that list. It is assumed that the owner controls the use of a DL by the "DL submit permission" (see 14.2/F.400/X.400).

There may be commercial reasons to implement services that fall outside of the previous paragraph. At this time, such arrangements are subject to bilateral agreement.

Implementations that require the return of accounting information to the originating ADMD are for further consideration.

5.4.1.10 Secured messaging services

The definition of additional cost elements associated with the encryption of messages, and secured messaging services in general, by ADMDs is for further study.

5.4.1.11 Access to directory services

Recognizing that international directory services may be used for:

1) user friendly naming;

2) access to distribution lists; and

3) determination of recipient capabilities and authentication,

accounting and settlement between ADMDs and directory service providers may be required for such items as number of search attempts and number of addresses retrieved, as well as updates effected. (For further study.)

5.4.1.12 Other optional user facilities

Accounting for other optional user facilities is not presently part of this Recommendation, but may be implemented subject to bilateral agreement.

5.4.2 Delivery to an UA belonging to an ADMD

UAs belonging to an ADMD include both co-located UAs and stand-alone UAs. The suggested unit for measuring message size for accounting is the octet, without rounding. Delivery to a stand-alone UA addressed by an X.121 address is treated as a delivery via an access unit.

5.4.3 Transfer to a PRMD

A recipient address is considered as belonging to a PRMD only if the address contains the PRMD-name standard attribute. The suggested unit for measuring message size for accounting is the octet, without rounding.

5.4.4 Telex delivery

The suggested unit for measuring message size for accounting is the octet, without rounding. Other units may be used by bilateral agreement.

5.4.5 Fax delivery

The suggested unit for measuring message size for accounting is the octet, without rounding. Other units may be used by bilateral agreement.

5.4.6 Physical delivery

The suggested unit for measuring message size for accounting is the octet, without rounding. Other units may be used by bilateral agreement.

5.4.7 Teletex delivery

For further consideration.

5.4.8   Transit

Transit is defined as the transfer of a message from the originating ADMD to the destination ADMD via one or more intermediate ADMDs.

Transit permission (including route) and associated charges shall be by prior agreement with all the ADMDs concerned. The accounting rates applicable shall be based on the formulas shown in clause 6 and shall be determined on a bilateral basis between consecutive ADMDs along the transit route. Nevertheless, several methods of settlement may be used under the formulas in clause 6. If, for example, ADMD A originates a message which is destined for ADMD C via ADMD B, the following scenarios may occur:

    i)   ADMD A may settle with ADMD B to cover the costs incurred by ADMD B for message processing and network transmission costs and then with ADMD C for the costs occurred by ADMD C for the latter's cost of message processing and delivery.

    ii)   ADMD A may settle with ADMD B to cover all message processing, network transmission and delivery costs, and ADMD B in turn, may settle with ADMD C to cover the latter's message processing and delivery costs.

The above scenarios may be extended to cases where more than one intermediate ADMD provides transit services between the originating and destination ADMDs.

It is understood that the processing, delivery and transfer rates applied by an ADMD for direct service with another ADMD may be different from the rates applied in transit relationships. Thus, if a multi-address message results in delivery of the message both within the intermediate ADMD and additional ADMDs, then the formula used for settlement with the originating ADMD may contain different rates to take account of the fact that each address is handled differently.

5.4.9   Forwarding

Forwarding is the onward submission of a received message to one or more recipients where a new accounting transaction is initiated.

6   Accounting formulas for services

6.0   General

This subclause contains the recommended accounting formulas for service. When these formulas are applied, the total outpayment for services will be the sum of the formulas in 6.1 and 6.2.

6.1   Delivery to UAs and transfer to PRMDs

The formula for single or multiple address messages delivered to UAs belonging to an ADMD and/or transferred to PRMDs is as follows:

$$S = a * R + b * P1e * D + c * P1e * D'$$

where

    S is the per-message outpayment;

    a is the total number of O/R addresses (UAs belonging to the ADMD and O/R addresses belonging to PRMDs);

    b is the number of addressed UAs which belong to an ADMD;

    c is the number of addressed PRMDs;

    $P1e$ is the size of the P1 message envelope and content in octets;

    R is the processing rate per address at the destination ADMD;

    D is the delivery rate per octet to a UA;

    D' is the transfer rate per octet to a PRMD;

    $*$ is the multiplication symbol.

An ADMD may choose to account for a message addressed to multiple UAs belonging to one ADMD as a single address message.

For this formula, address refers to a recipient with the responsibility flag on (see X.400-Series Recommendations).

6.2 Deliveries made via access units

6.2.1 General

MH systems have the ability of delivering message traffic to non-MH systems via access units. Such deliveries include:

–   delivery to remote user agents identified by an X.121 address;

–   delivery to telex, via a telex access unit;

–   delivery to G3 facsimile, via a fax access unit;

–   delivery to a PDS via a physical delivery access unit.

Other access unit deliveries are held for further consideration.

6.2.2 Accounting methods for other delivery mechanisms

6.2.2.1 Estimated accounting method required

For the estimated accounting method, the following formula will apply:

$$S = a * R + \Sigma i \ [x(i) * P1e * D(i) + x(i) * E(i)]$$

where

S	is the per-message accounting;
a	is the total number of addresses;
R	is the processing rate per address at the destination ADMD;
Σi	is the sum per service type (i);
x(i)	is the number of messages delivered by delivery service type (i);
P1e	is the size of the P1 message envelope and content in octets;
D(i)	is the delivery rate per octet by delivery service type (i);
E(i)	is a per-message rate for delivery service type (i), independent of length for delivery via a PDS, telex or fax access unit. By bilateral agreement, E(i) may be set to 0 for any specified delivery type;
*	is the multiplication symbol.

Different rates D(i) and E(i) will be applied by type of service. These will be designed to ensure a full recovery of all costs associated with all deliveries over each accounting period.

The derivations of D(i) and E(i) by type of service will be determined by the recipient ADMD.

For this formula, address refers to a recipient with the responsibility flag on (see X.400-Series Recommendations).

6.2.2.2 Exact accounting method

Exact accounting will be based on per-message accounting information. However, until a cost effective exact accounting methodology based on per-message information is available, ADMDs should not attempt to employ this methodology.

6.3 Accounting method for reverse charging

The formula to be used when reverse charging is implemented is as follows:

$$S = a' * R' + P1e * O$$

where

      S   –   is the per-message outpayment;

      a'   –   is the total number of O/R addresses (UAs belonging to the ADMD and O/R addresses belonging to PRMDs);

      P1e   –   is the size of the P1 message envelope and content in octets;

      R'   –   is the processing rate per address at the originating ADMD;

      O   –   is the rate per octet at the originating ADMD which includes access, processing and network utilization costs;

      *   –   is the multiplication symbol.

6.4 Time as an element in accounting

6.4.1 ADMDs may wish to offer service types which are defined by time of day and day of the week.

6.4.2 In the case of time-dependent services, the time which is used for accounting purposes is the time the message left the MTA of the originating ADMD.

6.4.3 Time-dependent services and rates are defined on a bilateral basis.

7 Settlements

Settlements of the balances of accounts will take place based on the provisions of Article 6 of the International Telecommunications Regulations (Melbourne, 1988).

Annex A

Abbreviations
(This annex forms an integral part of this Recommendation)

For the purposes of this Recommendation, the following abbreviations are used:

ADMD	Administration Management Domain
AU	Access Unit
DDA	Domain Defined Attribute
DL	Distribution List
DTE	Data Terminal Equipment
EDI	Electronic Data Interchange
EIT	Encoded Information Type
F.400/X.400	ITU-T Recommendation, Message handling services – Message handling system and service overview
IA5	International Alphabet No. 5
MH	Message Handling
MHS	Message Handling System
MTA	Message Transfer Agent

O/R	Originator/Recipient
OSI	Open Systems Interconnection
P1	MTS Transfer Protocol
P1e	MTS Transfer Protocol Entity
PD	Physical Delivery
PDS	Physical Delivery System
PRMD	Private Management Domain
SDR	Special Drawings Rights
TLX	Telex
TTX	Teletex
UA	User Agent
X.121	Denotes a Network Address following ITU-T Recommendation X.121

Annex B

Glossary

(for further study)

(This annex forms an integral part of this Recommendation)

All explanations given are assumed to be in the context of the message handling systems and services, unless otherwise noted. These are in addition to Recommendation F.400/X.400, Annexes A and B.

For the purposes of this Recommendation, the following definitions apply:

B.1　　**destination ADMD**: The ADMD of whom the recipient of a message is considered to be a customer.

B.2　　**octet**: A string of 8 bits without regard to the content of those bits.

B.3　　**originating ADMD**: The ADMD from which the originator acquires message handling services.

B.4　　**OSI layers**: The seven layers of interconnection as described by ISO/OSI standards.

B.5　　**component rates**: The rates for processing, delivery and transfer of messages, identified by cost elements [4] and [5] in Figure 1.

B.6　　**total outpayment**: The sum of the component rates multiplied by their associated variables, based on the formulas in 6.1 and 6.2.

B.7　　**service messages**: They are understood as belonging to "Service Telecommunication" in the context of message handling.

Annex C

Account statement

(This annex forms an integral part of this Recommendation)

A suggested format for monthly inter-ADMD account statement with examples. The method of exchange of information, such as that described in ITU-T Recommendation D.190 is for bilateral agreement.

ADMD A in account with ADMD B for Message Handling Traffic for the month of ......

1.	Sent paid messages						
Origin. ADMD (1)	Via (2)	Dest. ADMD (3)	Component (4)	Number of units (5)	Component rate (6)	Curr. (7)	Out- payment (8)
ABC/US	Direct	XYZ/UK	Process	3000	R	SDR	(5) * (6)
ABC/US		XYZ/UK	PDS/BAS	2000	D(i)	SDR	(5) * (6)
ABC/US		XYZ/UK	PDS/SUR	2000	E(i)	SDR	(5) * (6)
ABC/US		XYZ/UK	UA		D	SDR	(5) * (6)
						Subtotal outpayment	

2.	Reverse charged messages						
(3)	(2)	(1)	(4)	(5)	(6)	(7)	(8)
XYZ/UK	Direct	ABC/US	Address	3000	R′	SDR	(5) * (6)
XYZ/UK		ABC/US	Composite	1000	O	SDR	(5) * (6)
						Subtotal outpayment	
						Grand total outpayment	

Key	(1)	Originating "A" ADMD	(5)	Unit count per component rate
	(2)	Forwarding "B" ADMD	(6)	Component rate
	(3)	Destination ADMD	(7)	Currency (SDRs)
	(4)	Component used	(8)	Outpayment

Component (this is given for illustration and is not complete)		*Definition*	*Equivalent to*
Composite	–	Access, processing and network utilization costs at the originating ADMD	$(P1e * 0)$
Process	–	Processing at recipient ADMD	(a)
Address	–	Processing at originating ADMD	(a')
UA	–	Co-located user agent deliveries	$(b * P1e)$
TLX/BAS	–	Telex (Basic)	$[x(i) * P1e]$
TLX/SUR	–	Telex (Surcharge)	$x(i)$
FAX/BAS	–	Fax delivery (Basic)	$[x(i) * P1e]$
FAX/SUR	–	Fax (Surcharge)	$x(i)$
PDS/BAS	–	Physical delivery (Basic)	$[x(i) * P1e]$
PDS/SUR	–	Physical delivery (Surcharge)	$x(i)$
PRMD	–	PRMD transfer	$(c * P1e)$

NOTES

1   For normal traffic (2) and (3) will be the same. For forwarded traffic (3) will be the destination ADMD.

2   Each accountable factor is given a separate rate description, such as delivery type, delivery surcharge, processing, etc.

3   The outpayment is derived by multiplying the relevant outpayment rate by the number of units (i.e . columns 5 * 6).

4   Where per-message surcharges apply, messages are counted and accounted for as separate components.

5   In this and the following annexes, * is used as the multiplication symbol.

6   The above account statement may also be used where, by bilateral agreement, the recipient of the EDIM is charged for the message. However, the components will vary according to the formulas used.

Annex D

Example account

(based on the example calculations)

(This annex forms an integral part of this Recommendation)

USA (A) in account with UK (B) for Message Handling Traffic for the month of: October 1989

Origin. ADMD (1)	Via (2)	Dest. ADMD (3)	Component (4)	Number of units (5)	Component rate (6)	Curr. (7)	Out- payment (8)
USA (A)	Direct	UK (B)	Process	49	R	SDR	(5) ∗ (6)
USA (A)	Direct	UK (B)	UA	121000	D	SDR	(5) ∗ (6)
USA (A)	Direct	UK (B)	TLX/BAS	12000	D (telex)	SDR	(5) ∗ (6)
USA (A)	Direct	UK (B)	TLX/SUR	2	E (telex)	SDR	(5) ∗ (6)
USA (A)	Direct	UK (B)	PDS/BAS	36000	D (PDS)	SDR	(5) ∗ (6)
USA (A)	Direct	UK (B)	PDS/SUR	6	E (PDS)	SDR	(5) ∗ (6)
JAP (A)	USA (A)	UK (B)	Process	20	R	SDR	(5) ∗ (6)
JAP (A)	USA (A)	UK (B)	UA	20000	D	SDR	(5) ∗ (6)
JAP (A)	USA (A)	UK (B)	PRMD	2000	D′	SDR	(5) ∗ (6)
USA (A)	UK (B)	FRA (C)	Process	1	R	SDR	(5) ∗ (6)
USA (A)	UK (B)	FRA (C)	FAX/BAS	5000	D (FAX)	SDR	(5) ∗ (6)
USA (A)	UK (B)	FRA (C)	FAX/SUR	1	E (FAX)	SDR	(5) ∗ (6)
				Total outpayment		SDR	(Sum of column)

Annex E

Example calculations

(This annex forms an integral part of this Recommendation)

E.1   Direct terminal route – USA (A) to UK (B)

The termination of 1 message of 1000 octets, to 1 co-located UA (i.e. 1 address), sent in October 1989.

Formula to be used: $S = (a * R) + (b * P1e * D) + (c * P1e * D′)$

The calculation: $S(1) = (1 * R) + (1 * 1000 * D)$

E.2   Indirect terminal route – Japan (A) to UK (B) via USA (A)

The termination of 1 message of 2000 octets, to 10 co-located UAs (i.e. 10 UA addresses) and to 1 PRMD with 10 addresses, sent in October, 1989.

Formula to be used: $S = (a * R) + (b * P1e * D) + (c * P1e * D′)$

The calculation: $S(2) = (20 * R) + (10 * 2000 * D) + (1 * 2000 * D′)$

E.3   Transit route – USA (A) to France (C) via UK (B)

The termination of 1 message of 5000 octets, to 1 non-MH System (FAX) via an access unit (i.e. to 1 address), sent in October, 1989.

Formula to be used: $S = (a * R) + \sum i\,[(x(i) * P1e * D(i)) + (x(i) * E(i))]$

The calculation: $S(3) = (1 * R) + (1 * 5000 * D(FAX)) + (1 * E(FAX))$

E.4   Direct terminal route – USA (A) to UK (B)

The termination of 1 message of 6000 octets, to 20 co-located UAs, 2 PRMDs with 10 addresses each, 2 telexes via a telex access unit, and 6 messages delivered to a PDS via a physical delivery access unit, sent in October, 1989.

Formula to be used: $S = (a * R) + (b * P1e * D) + (c * P1e * D') + \sum i\,[(x(i) * P1e * D(i)) + (x(i) * E(i))]$

The calculation: $S(4) = (48 * R) + (20 * 6000 * D) + (2 * 6000 * D') +$

$\{(2(\text{telex}) * 6000 * D(\text{telex})) + (2(\text{telex}) * E(\text{telex}))\} +$

$\{(6(\text{PDS}) * 6000 * D(\text{PDS})) + (6(\text{PDS}) * E(\text{PDS}))\}$

Annex F

Examples of reverse charging accounting
(This annex forms an integral part of this Recommendation)

The following examples detail the method to be followed for reverse charged messages.

F.1   Direct terminal route – UK (A) to USA (B)

The termination of 1 message of 1000 octets, to 1 co-located UA (i.e. 1 address), sent in October 1989.

Formula to be used: $S = a' * R' + P1e * O$

The calculation: $S = (1 * R') + (1000 * O)$

F.2   Indirect terminal route – UK (A) to Japan (B) via USA (A)

The termination of 1 message of 2000 octets to 10 co-located UAs (i.e. 10 UA addresses) and to 1 PRMD with 10 addresses, sent in October 1989.

Formula to be used: $S = a' * R' + P1e * O$

The calculation: $S = (20 * R') + (2000 * O)$

F.3   Transit route – France (A) to USA (C) via UK (B)

The termination of 1 message of 5000 octets, to 1 non-MH system (FAX) via an access unit (i.e. to 1 address), sent in October 1989.

Formula to be used: $S = a' * R' + P1e * O$

The calculation: $S = (1 * R') + (5000 * O)$

NOTE – In this instance, since the message is reverse charged, the ADMD in the USA is assumed to recover the cost of the Fax delivery from its subscriber. Therefore, no separate calculation is necessary for that component.

F.4   Direct terminal route – UK (A) to USA (B)

The termination of 1 message of 6000 octets, to 20 co-located UAs, and to 2 PRMDs with 10 addresses each, sent in October 1989.

Formula to be used: $S = a' * R' + P1e * O$

The calculation: $S = (40 * R') + (6000 * O)$