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**Universal Personal Telecommunication (UPT);
The service concept
Part 3: Service aspects of charging, billing and accounting**

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Foreword

ETSI Technical Reports (ETRs) are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim-European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or I-ETS.

This ETR details the service requirements on the charging and billing mechanism invoked with the Universal Personal Telecommunication (UPT) service and specifies the principles for international accounting.

This ETR constitutes Part 3 of a multi-part ETR, with the following titles:

- ETR 055-1: "Universal Personal Telecommunication (UPT); The service concept Part 1: Principles and objectives".
- ETR 055-2: "Universal Personal Telecommunication (UPT); The service concept Part 2: General service description".
- ETR 055-3: "Universal Personal Telecommunication (UPT); The service concept Part 3: Service aspects of charging, billing and accounting".
- ETR 055-4: "Universal Personal Telecommunication (UPT); The service concept Part 4: Service requirements on security mechanisms".
- ETR 055-5: "Universal Personal Telecommunication (UPT); The service concept Part 5: UPT terminals and UPT access devices".
- ETR 055-6: "Universal Personal Telecommunication (UPT); The service concept Part 6: UPT subscription and service profile".
- ETR 055-7: "Universal Personal Telecommunication (UPT); The service concept Part 7: User procedures and user states".
- ETR 055-8: "Universal Personal Telecommunication (UPT); The service concept Part 8: Man-machine interface aspects".
- ETR 055-9: "Universal Personal Telecommunication (UPT); The service concept Part 9: Service requirements on numbering, addressing and identification".
- ETR 055-10: "Universal Personal Telecommunication (UPT); The service concept Part 10: Supplementary services".

An additional part, (Part 11), which details the requirements on the protection of third parties, is due for publication in 1993.

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1 Scope

This ETSI Technical Report (ETR) details the service requirements on the charging and billing mechanism involved with the Universal Personal Telecommunication (UPT) service, and the necessary information transfer required between UPT service providers and network operators. It also specifies the principles for international accounting. Detailed realisation of these mechanisms are not specified in this ETR.

2 Charging and billing principles

2.1 Charging

A UPT subscriber associated to a UPT user should be charged on the basis of a unique user identification. The UPT subscriber's charging account should be associated with the UPT user's UPT number.

The basic structure of the UPT charging model should, whenever possible, be consistent with those of the services offered by the serving networks, i.e. when using the services without a UPT number. However, the UPT subscriber associated to a UPT user should be offered various options to select the charging model which best suits his needs.

The following types of charges may, in principle, apply to UPT:

- 1) subscription related charges;
- 2) subscription management related charges;
- 3) call related signalling charges;
- 4) location related charges.

2.1.1 Subscription related charges

The UPT service provider may charge the UPT subscriber a fixed amount related to the UPT subscription alone, e.g. a fixed amount per month. These charges are not related to any UPT procedures, and are to be decided by the UPT service provider or by appropriate national authorities.

2.1.2 Subscription management related charges

Subscription management related actions may be divided into two types of actions:

- service management related actions;
- personal mobility related actions.

These relate, respectively, to UPT service management procedures and personal mobility procedures.

The UPT service provider may charge the UPT subscriber for service management related actions, i.e. actions that a UPT user performs to modify the information included in the service profile by means of service profile management procedures. These charges may either occur as a fixed amount related to the UPT subscription alone, e.g. a fixed amount per month, or on a per action basis. These charges are to be decided by the UPT service provider or by appropriate national authorities.

The UPT service provider may, however, normally not charge the UPT subscriber for personal mobility related actions, i.e. actions that a UPT user performs to modify the information included in the service profile by means of personal mobility procedures. These actions form the basis for the success of the UPT service itself, and are actions primarily needed by the UPT service entity to maintain contact with the UPT user. It should be noted that in a PLMN, these actions are carried out automatically and are not seen by the subscriber. Charging for personal mobility related actions should normally be implicitly covered by subscription related charges.

2.1.3 Call related signalling charges

2.1.3.1 Introduction

Call related signalling charges are charges that relate to the signalling part of a call, e.g. for connection establishment. The principles for such charges can, in principle, be different for successful calls and unsuccessful calls.

These charges are related to the use of the UPT call handling procedures, and are to be decided by the UPT service provider or by appropriate national authorities.

The UPT service provider should be allowed to charge for call related signalling actions, as UPT will involve a much greater amount of signalling than in today's networks, due to extensive use of databases.

If the UPT service provider wishes not to charge for call related signalling actions, as an alternative, all charges related to the signalling part of UPT calls may also implicitly be included in the fixed subscription related charges to the UPT subscriber.

2.1.3.2 Possible solution

In a UPT environment, it is reasonable to assume the following from the user's point of view:

- the calling party will realise that he is making a UPT call, because of the UPT access code, and may, therefore, be willing to receive minor additional charges compared to a normal non-UPT call;
- the UPT subscriber associated with the called UPT user would not want to be charged for unsuccessful incoming UPT calls as the size of these charges cannot be predicted. He may, however, accept charges for successful incoming calls if their cost can be predicted;
- neither the calling party nor the UPT subscriber associated with the called UPT user would want to be charged for unpredictable call related signalling actions.

2.1.3.2.1 Default charging

Charges for call related signalling actions may be charged to the calling party as a flat charge, in addition to the connection related charges, if any. This flat charge would apply equally to successful and unsuccessful calls. The UPT subscriber associated with the called UPT user should normally not be charged for call related signalling actions.

2.1.3.2.2 Optional charging

The UPT subscriber should have the possibility to deviate from the default call related signalling charges described above. Possible deviations could include:

- the UPT subscriber associated with the called UPT user could accept all call related signalling charges from a set of callers, for successful incoming calls or for all incoming calls. This should, however, only be allowed in connection with the same acceptance for connection related charges.

The various options in charging may, e.g. be provided by UPT-specific supplementary services.

2.1.4 Location related charges

2.1.4.1 Introduction

Location related charges are charges related to the actual locations of the communicating parties. These charges are not related to the use of any UPT procedures, and are to be decided by the UPT service provider or by appropriate national authorities. In principle, these could depend on various factors, e.g.:

- the calling and called users locations;

- the time of the day;
- the duration of the communication;
- etc.

Concerning the calling and the called users locations, the tariffs used by a given UPT service provider can generally be split into 3 parts, originating from:

- 1) the originating access network;
- 2) the intermediate transit network;
- 3) the terminating access network.

In the general case, all of them must be assumed to be operated by different network operators, and there are internationally agreed methods to deal with this.

The tariff parts coming from the originating and terminating access networks may also depend on the type of access used (e.g. whether it is a radio access or a fixed access).

The UPT service provider must have a mutual agreement with other service providers and network operators. However, from the UPT service providers' point of view, the following factors could also have impact on the location related charges applied:

- if the A-user and/or the B-user are UPT users or non-UPT users;
- if the UPT user A and/or the user B are at their permanent location or not.

This mobility aspect is illustrated in figure 1.

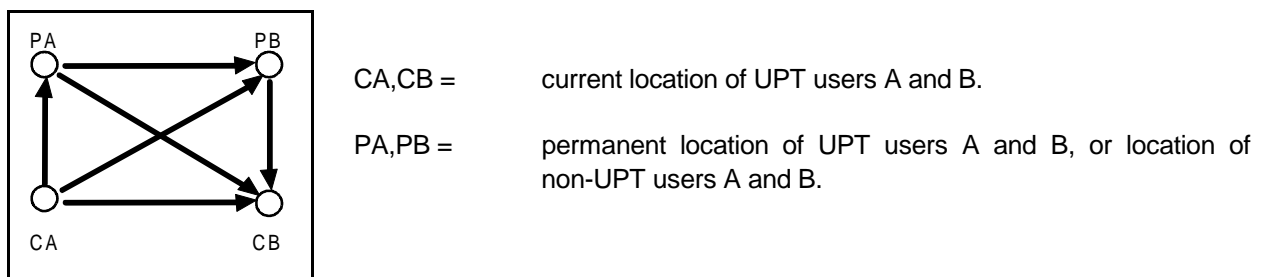


Figure 1: Possible routes as a basis for location oriented charges

In principle, location related charging can be based on the connection CA->CB or split into parts in several ways as follows:

- 1) (CA->PA) + (PA->PB) + (PB->CB)
- 2) (CA->PB) + (PB->CB)
- 3) (CA->PA) + (PA->CB)

Any part of these charges or all charges, can in principle be applied to user A, B or even to a third party, and on a permanent, semi-permanent or on a call-by-call basis. Whenever a party is charged, the party in question must be aware of it and have control over it (acceptance, refusal, negotiation). Consequently, charging announcements may be needed in cases other than expected.

NOTE: In the following discussions of possible solutions for location related charges, it is generally assumed that the long-term objective of UPT implementation is optimised routing of calls. However, depending on results of the work on network aspects of implementation, it is recognised that during the introduction of UPT, restrictions in existing networks may limit the possibility of optimised routing.

For the long-term objective of UPT, the total location related charge for the call should be from CA to CB, independent of the routing of the call.

2.1.4.2 Possible solution

In the PSTN today, the party charged for the communication is generally the calling party (the A-subscriber). In the pan-European public land mobile network (GSM), the calling party and called party (the B-subscriber) have split charging, where the calling party is charged for the part of the communication up to the called party's home location, while the called party is charged for the roaming part of the connection.

In a UPT environment, it is reasonable to assume the following from the user's point of view:

- the calling party should generally be willing to be charged for outgoing calls, provided the calling party can predict the approximate cost of the call;
- also, the called party would like to know the approximate cost of receiving calls;
- the UPT subscriber associated with the called UPT user may be willing to be charged for receiving calls when the UPT user is temporarily away from the home location. However, on the other hand, he may not want to be charged for receiving calls if the called UPT user is more often at a location other than the home location;
- the network solutions for UPT are generally invisible to the users, whether called party or calling party. The calling party knows **a priori** only his own physical location and the UPT number of the called party. The called UPT user knows **a priori** his physical permanent location and his current physical location;
- neither the calling nor the UPT subscriber associated with the called UPT user would like to be charged with long-distance charges for a call that **a posteriori** has been identified as a short-distance or local call because of roaming.

2.1.4.2.1 Default charging

Split charging: The charging of a UPT call should be based on what is known to the users, whether calling party or called party. Hence, the charging of a UPT call should generally be split between the called party and the calling party as follows:

- the calling party is at the maximum charged for the part of the call from his own physical location to the "temporary home location" of the called subscriber. The temporary home location and the default home location of the called UPT user would normally be identical;
- the UPT subscriber associated with the called UPT user is at the maximum charged for the part of the call from the UPT user's temporary home location to his "current location". The current location is the location at which the call is received, and the temporary home location the location on which split charging is based;

NOTE 1: The default home location, temporary home location and current location of the UPT user are not to be understood as unique locations (e.g. specific terminal accesses), but as certain geographical areas.

NOTE 2: The notion of "temporary home location" is proposed from a service point of view. Further study is required to determine the consequences for the network.

- when the current location of the called UPT user is significantly closer to the physical location of the calling subscriber than the called UPT user's temporary home location, so that the charges for the calling subscriber would be significantly lower when based on the current location of the called UPT user, then the calling subscriber should be charged for the whole connection from his own physical

location to the called UPT user's current location, and the UPT subscriber associated to the called UPT user should not be charged at all;

- the UPT user should have the possibility to modify his temporary home location in order to avoid charging for incoming calls;
- if the called UPT user's temporary home location deviates from his default home location so that the charges to the calling subscriber may increase significantly from what is expected, then the calling subscriber may receive an announcement indicating the temporary home location of the called subscriber.

This announcement is conditional to the called UPT user's current location. If this location is within some area defined by the calling user's physical location and the called UPT user's default home location, then no such announcement is necessary.

The location related charging principle indicated above applies generally to a UPT subscriber associated with a called UPT user, irrespective of whether or not the calling party is a UPT user. The default home, temporary home and current locations of the called UPT user and the physical location of the calling subscriber are indicated in figure 2.

2.1.4.2.2 Optional charging

The UPT subscriber associated with a UPT user should have the possibility to deviate from the default location related charging principle described above. Possible deviations could include:

- the UPT subscriber associated with a called UPT user could accept all call charges or part of the charges, from a set of callers;
- the UPT subscriber associated with a called UPT user could refuse any charges connected with incoming calls from a set of callers. In this case, a negotiation procedure is necessary;
- the UPT subscriber associated with a calling UPT user could accept all call charges to a set of UPT users;
- the UPT subscriber associated with a calling UPT user could refuse all call charges, or part of the charges, to a set of UPT users. In this case, a negotiation procedure is necessary;

The various options in charging may, e.g. be provided by UPT-specific supplementary services.

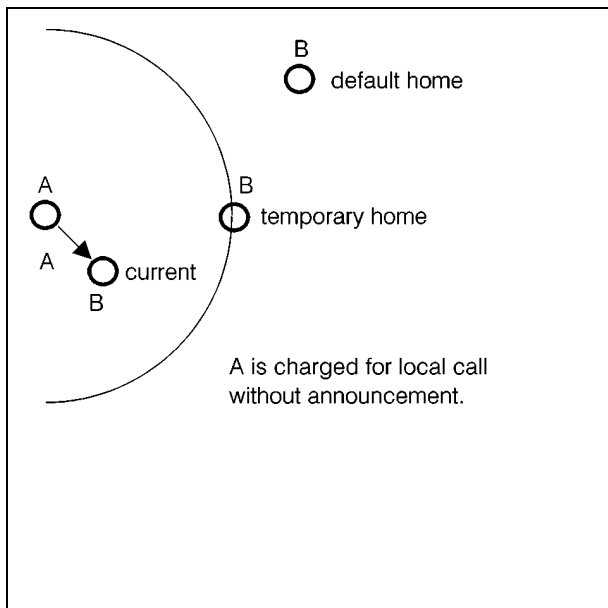
2.1.4.2.3 Other charges

If the called party is a non-UPT user, the charging principle would then be as in the network used, irrespective of whether or not the calling party is a UPT user, and is irrelevant to the UPT service.

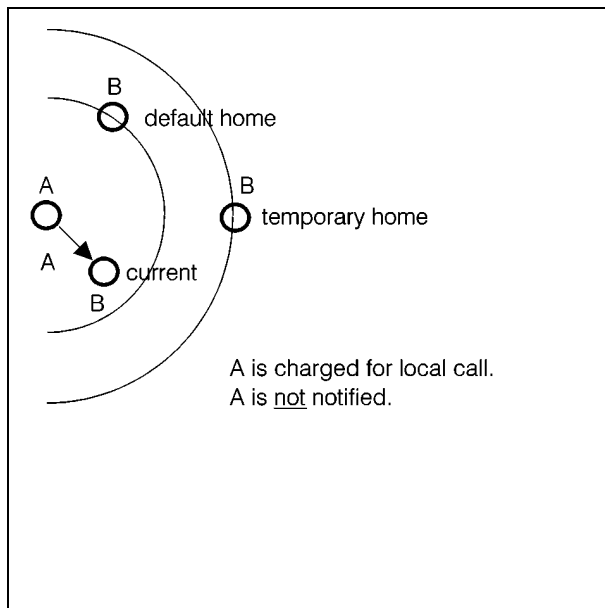
If the originating network does not support UPT, then an UPT incoming call implies a leg to the home country of the called subscriber, then the charges for that leg will be applied to the calling party, while the remaining part of the charges will be applied to the UPT subscriber.

2.1.5 Supplementary/additional charges

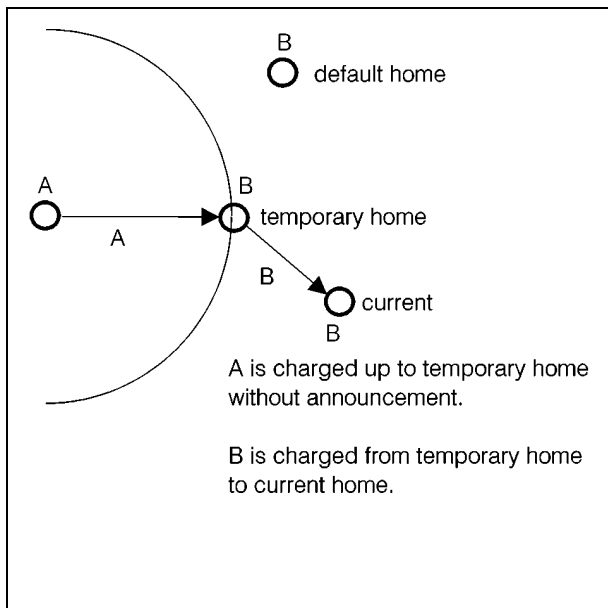
Specific charges may be levied for UPT supplementary services, additional and supplementary UPT features. These may be charged on a subscription basis and/or on an invocation basis.



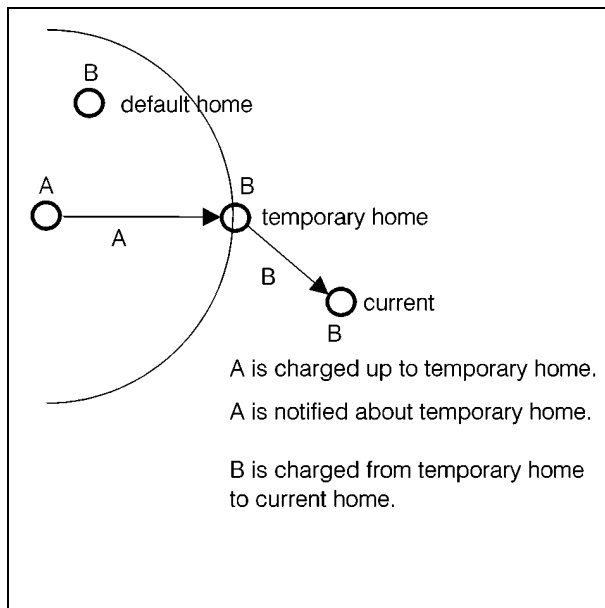
2a: Location related charging (case 1)



2b: Location related charging (case 2)



2c: Location related charging (case 3)



2d: Location related charging (case 4)

Figure 2

2.2 Billing

The UPT subscriber associated with a UPT user should only have to receive bills from one source per UPT subscription, normally from his UPT service provider.

3 Accounting and operational aspects

3.1 General requirements

International UPT traffic may be originated and terminated in any national network with UPT capabilities. The UPT-subscriber will, however, only need to deal with his home UPT service provider.

3.1.1 General principles

The routing of the UPT traffic should always follow the regular international routes between the fixed networks in the countries concerned. The existing international accounting principles are applicable between these fixed networks.

The existing international accounting principles should not be effected by UPT introduction. A UPT service provider will have to establish agreements with national network operators supporting UPT in the home country. In addition UPT service providers may have to establish agreements with network operators supporting UPT and UPT service providers in countries of interest for roaming.

3.1.2 Inter-operator requirements

Special inter-operator relations are required in a multi-network operation and, possibly, multi UPT service provider environment.

The agreements between a UPT service provider and network operators supporting UPT must contain regulations related to accounting and billing. It will be necessary to establish an international transfer account procedure and billing information to be exchanged between different operators and UPT service providers.

3.1.3 Subscription related requirements

It must be assumed that UPT users will want to roam outside areas covered by their home UPT service providers. UPT subscribers associated with such UPT users must apply to their home UPT service provider for a UPT subscription containing the necessary entitlements to make use of the UPT service in the requested geographical area.

The home UPT service provider will then, at subscription time, issue an admission to the UPT subscriber to utilise the transferred account procedure. This transferred account procedure will be based on a UPT number issued by the home UPT service provider.

3.2 Transfer of charging information between operators

3.2.1 General

The transferred account procedure and billing information will be applied to all telecommunications services which are available in the actual network supporting UPT.

An international clearing house should be used for accounting handling between UPT service providers and network operators.

Each transfer should be notified to the international clearing house and the actual payment should take place after notice from the clearing house. A copy of the notification sent to the clearing house should also be sent to the home UPT service provider. The notification must contain information to identify the individual transfers (i.e. transfer number and creation date).

As an alternative, the UPT service providers and network operators may also agree on different procedures for notification and payment on a bilateral or multilateral basis.

3.2.2 Exchange of transferred accounts and billing

The operator of networks supporting UPT must regularly (x times a month) prepare a transfer account and billing information for each UPT service provider with whom he has an agreement. The network operator must at least prepare an agreed minimum of information relevant to the transfer account.

The transfer must include all calls up to a fixed point in time prior to the date of transfer.

All transferred information must be retained for a minimum of X months by the network operator. At the request of a UPT service provider, this information may be made available.

3.2.3 Network operator identification

For transfer of billing information, the network operators supporting UPT must provide a minimum of network operator specific data, including:

- 1) name of network operator;
- 2) address for correspondence related to operation of the transferred account and billing procedure;
- 3) availability of telecommunications services for the UPT subscribers;
- 4) any special observations or instructions.

3.2.4 Accounting format

The accounting format must contain an agreed minimum of information with:

- header and trailer of record;
- per call information:
 - originated calls;
 - terminated calls.

3.3 International accounting

3.3.1 General

To facilitate the international accounting between operators in different countries with different currencies, a common currency will be necessary. This currency may be a virtual currency.

3.3.2 The transferred account

UPT users will visit and use networks supporting UPT. The operators of visited networks will create charging records as if the visiting subscribers were "home" subscribers. The prices should be regular prices of the visited networks.

The prices on the individual charging record should be converted into the common currency for inclusion in the transfer account.

At regular intervals the charging records should be made up into files (transfers) and transmitted by agreed standards to the home UPT service providers.

3.3.3 Inter-operator invoice

At regular intervals (monthly) the visited operators should prepare an invoice, which should be the billing for the transfers to the home UPT service providers.

If Value Added Tax (VAT) is charged by visited operators, the home UPT service providers should be able to recover the VAT. To facilitate VAT recovery, the invoice should be expressed in local currency of the country of visited operator.

3.3.4 Settlement

The home UPT service provider may settle the balance directly with the visited operator according to invoices.

However, to reduce the number of settlement transactions, an international clearing house should be used. The balances agreed between the parties should be reported to the clearing house for settlement.

The clearing house will use the common currency and convert the balances before settlements take place.

History

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