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**ETSI**

European Telecommunications Standards Institute

**ETSI Secretariat**

**Postal address:** F-06921 Sophia Antipolis CEDEX - FRANCE

**Office address:** 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

**X.400:** c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

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## Foreword

This ETSI Technical Report (ETR) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

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 the application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or an I-ETS.

This ETR provides a description of generic Universal Personal Telecommunication (UPT) requirements on the network, related to charging, billing and accounting of UPT and the corresponding network functionality that are needed.

This Second Edition of ETR 065 provides an additional clause 7 describing call event information.

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## 1 Scope

This ETSI Technical Report (ETR) provides a description of generic Universal Personal Telecommunication (UPT) requirements on the network, related to charging, billing and accounting of UPT, and the corresponding network functionality that are needed. It does not provide the charging, billing and accounting principles related to any specific phase of UPT service offering.

## 2 References

The following reference is used from within this ETR.

- [1] ETR 055-3: "Universal Personal Telecommunication (UPT); The service concept; Part 3: Service aspects of charging, billing and accounting".

## 3 Abbreviations

For the purposes of this ETR, the following abbreviations apply:

CER	Call Event Recording
CLI	Calling Line Identity
IN	Intelligent Network
ISDN	Integrated Services Digital Network
PUI	Personal User Identification
SSP	Service Switching Point
UPT	Universal Personal Telecommunication
UPTN	UPT Number

## 4 Charging mechanisms

Since UPT, by its nature, will be universal and spanning across different nations, it is necessary to consider all different procedures adopted for charging world-wide. Such procedures may vary from country to country, however, they are basically of 2 types:

- **off-line charging**, i.e. itemized charging based on Call Event Recording (CER): this means that, at the time of each call, the network builds a "charging record" containing a detailed description of events related to that call, and at a later stage such a record will be processed off-line by a billing centre in order to determine the charges to be applied and the parties to be billed. In North America, for example, this is the charging procedure which is always adopted;
- **on-line charging**, i.e. bulk charging based on charging pulses and on pulse meters: this means that, at the time of each call, the network computes the charging rate or pulse rate for that call, and then adds charging pulses to a progressive meter, periodically, according to the computed rate. In Europe, for example, this is the most common procedure adopted, particularly for telephony.

## 5 Charging procedures for UPT

### 5.1 Incoming UPT calls

These are calls directed to a UPT subscriber, and are made by dialling the UPT number of that subscriber.

For incoming calls, as described in the service document, ETR 055-3 [1], various alternatives for charging and billing may exist. In particular, either the calling or the called party, or both, may be billed for the call. In addition, either the calling or the called party, or both, may be given a special audible announcement (or otherwise sent a message, e.g. a display on an Integrated Services Digital Network (ISDN) terminal), informing them of the charges to be expected for that call. Finally, an option is also considered, whereby the calling and called parties may negotiate the respective charges for the call before the call itself is through-connected.

These features have the following implications:

- since the UPT subscriber (called party) may be billed for (part of) the call, there is a need to support off-line charging in relation to the UPT subscriber's personal account. The charging record may include time of the call, service accessed, duration of the call, access network, storage used (voice bank, video bank, data bank, etc.). This information would then be sent to a billing centre to further process and generate a personalized bill;
- the calling party may also be billed for (part of) the call. The pulse rate to be applied to the pulse meter (in the case of on-line charging) or the information to be stored in the charging record (in the case of off-line charging) in general are different from those of a normal call. Therefore, the network must be capable of supporting this diversity and additional flexibility. A particular case is when the calling subscriber is not paying for the call and the charging mechanisms related to him/her must be inhibited;
- whenever a charging announcement has to be played or an equivalent indication has to be given to either party, this means that the network must be able to compute, in real time before the call is through-connected, the approximate tariff to be applied to the call;
- the option of negotiating charges for a call at call set-up time implies the definition of appropriate user procedures. It is foreseen that this feature could be fairly complicated to be provided by the network and, therefore, it might not be considered for the first phases of implementation of UPT, but for later phases.

In summary, additional functionalities are needed in the network in order to provide flexibility of charging as foreseen in UPT. Intelligent Networks (INs) are targeted to include such functionalities, since they will be required for UPT as well as for other services that are considered for IN provision, e.g. freephone, credit card calling, split charging, etc.

Regarding the complexity of the various charging options proposed for UPT, the critical factor may be the load on the telecommunications switches (Service Switching Points (SSPs) in the IN architectures), in terms of:

- processing load; and
- memory load.

A charging solution totally based on off-line processing may be better (in some cases) for load processing, as it does not imply complicated computations at call set-up time, but may be worse for memory load, as it may require a large memory space to (temporarily) store away the charging records.

Conversely, a charging solution involving on-line charging computations may be worse (in some cases) for processing load and better for memory capacity. Whenever charging announcements (indications) and/or pulse counters are involved, a certain amount of real time computation must be performed at the time of call set-up.



These issues need to be carefully evaluated against time scenarios, in order to determine the capabilities offered by existing (foreseen) technology, and the additional functionalities and performance issues implied by each option in charging and billing procedures.

## 5.2 Outgoing UPT calls

These are calls made by a UPT subscriber at any terminal, which should be billed to the UPT subscriber's personal account.

This implies at least the following:

- there is a need to support off-line charging. The charging record may include time of the call, service accessed, duration of the call, access network, storage used (voice bank, video bank, data bank, etc.). This information would then be sent to a billing centre to further process and generate a personalized bill;
- the normal charging procedures, by which the call would be charged onto the calling line or terminal identity, must be inhibited. This may be more complicated in general in the case of on-line charging procedures than in the case of off-line procedures.

In summary, it appears that for outgoing calls the network functionalities needed are a subset of those needed for incoming calls.

For outgoing and incoming calls, i.e. calls from a UPT subscriber to another UPT subscriber, both sets of considerations, as described above, will apply.

## 5.3 Subscription management

A particular case of UPT "calls" are the subscription management procedures, e.g. personal mobility management procedures, in which only one party exists, i.e. the calling party who is always a UPT user. Considerations reported in the preceding subclauses may also apply to the charging of these calls.

## 5.4 Other charges

All other types of charges that are related to a UPT call (e.g. signalling charges, volume-related charging, etc.) will either be charged to the calling party, or to the called party, and either of them may or may not be a UPT subscriber. The functionalities needed in the network for these types of charges, are for further study.

Administrative types of charges (e.g. subscription related charging) do not, in general imply additional functionalities in the telecommunications network, but they may influence the procedures in management centres and billing centres. This is not treated in detail in this ETR.

# 6 Additional charging issues

Early phases of UPT may be limited as to the charging functionality supported. This Clause provides an overview of additional functionalities or studies that may be needed for the later phases of UPT provision:

- the concept of a "temporary home" may be introduced for UPT subscribers staying in another network for an extended period of time. This implies that the charging arrangements need to be temporarily adapted to the split charging based on the temporary home, and not on the default home;
- splitting of connection-related charges may envisage more flexible situations than those provided for UPT Phase 1: e.g. percentage splitting. This implies additional flexibility in the network components related to charging functions;
- splitting of connection-related charges may be based not on a subscription basis, as in UPT Phase 1, but on a call by call basis. This has a heavy impact on the network functionalities, in particular, it requires a full definition of new user procedures for the interaction between network, calling user and called user at call set-up time, to decide on the charges for each call.

If different charging principles apply, e.g. charges related to the volume of the call (unrelated to the distance), other considerations may apply than given in the preceding subclauses.

## **7 Call event information**

Typically, for each call a call record is created, with information, used for example in charging or fraud management purposes.

The UPT service provider needs charging information from the network operator, in order to be able to make a bill for the UPT subscriber.

### **Example information to be included in the call record**

The following information may be needed to be contained in the call event record, for the service provider:

- Personal User Identification (PUI);
- UPT Number (UPTN), (mandatory if the PUI is not provided);
- visited network identity;
- cost (and currency, if applicable);
- date and time of authentication;
- date and time of the start of the call;
- date and time of the end of the call;
- call duration;
- origin (Calling Line Identity (CLI));
- dialled number;
- default charging reference location;
- number of data units, if packetization is used;
- routing address;
- re-routing number (e.g. call transfer);
- supplementary service indicator;
- bearer service indicator;
- teleservice indicator;
- surcharges (fixed fees);
- error code/release cause;
- partial output record;
- correlation identification;
- access category ("normal line", coinbox, hotel, office, etc.).

## History

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