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## Foreword

This ETSI Technical Report (ETR) has been produced by the Human Factors (HF) 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.

The intended users of this ETR include:

**Table 1: Intended users and potential benefits**

	<b>User</b>	<b>ETR used for</b>	<b>Potential Benefit</b>
1	ETSI Technical Committees	Development of standards that support users' requirements	Improved usability of services by ensuring consistent provision for user requirements throughout the development of UPT standards
2	UPT service and terminal designers	Development of UPT terminals and UPT service/s	Increased usability through early consideration of user requirements
3	UPT service providers	To assist the qualification of UPT terminals and services	Improved usability of UPT terminals and services through comparison with generic user requirements
4	User groups	To assess their requirements within those proposed for UPT terminals and services	Increased awareness by user groups of user requirements and their value in standards development
5	TC-HF	Continued development of user requirements for UPT and other telecommunication services	Improved usability through consistency and coherence of recommendations

## Introduction

This ETR identifies and defines the users' requirements for the Universal Personal Telecommunications (UPT) service. The requirements are intended to be generic to the concept of a UPT service, and as such concentrate principally on user-system issues, and secondly on user-interface issues. One purpose of the identification of these user requirements is to assess the completeness of the functional provisions that have been defined for the UPT service. A second purpose is to establish a minimum acceptable level of usability.

This ETR does not concentrate specifically on the physical or psychological design requirements of the UPT terminal or UPT access device, e.g. size and layout of keys, legibility of displays, choice of labels/services/menu items, choice of user control procedures, etc. There is no assumption made about how various service and network providers implement the user interface, but high conformance with these user requirements should help to ensure an acceptable minimum level of usability.

The user requirements take into account the needs of the user to have a consistent user interface across all providers, as well as the commercial needs manufacturers of to provide the most competitive user interface. The users requirements themselves reflect good human factors practice of ensuring that, for every user action feedback is given, and that any user interaction builds on knowledge and experience gained from the telephony service.

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## 1 Scope

This ETR defines the users' requirements for the Universal Personal Telecommunications (UPT) Service. All types of UPT users have been identified by reference to an UPT interaction model. The model was used to explore interaction scenarios, user procedures and tasks, which generated the users' requirements, both generic and specific.

These user requirements are intended to support implementations of a UPT service based on the functional provisions defined in ETR 055 [2], and ITU-T Recommendation F.851 [8], and implied within the ETSI work programme identified in TCR-TR 022 [6]. The requirements specifically exclude consideration of illegal or unauthorized use of the service.

The requirements have not been related to any phased implementation of the UPT service, and no specific design recommendations are made. An example of UPT user control procedures is given and illustrated by means of a set of Specification and Description Language (SDL) diagrams.

## 2 References

This ETR incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETR only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] CCITT Recommendation Z.100: "Specification and description language (SDL)".
- [2] ETR 055-1/10: "Universal Personal Telecommunications (UPT); The service concept; Part 1: Principles and objectives".
- [3] ETR 095: "Human Factors (HF); Guide for usability evaluation of telecommunications systems and services".
- [4] ETR 116: "Human Factors (HF); Human factors guidelines for ISDN Terminal equipment design".
- [5] ETR 170: "Human Factors (HF); Generic user control procedures for telecommunication terminals and services".
- [6] TCR-TR 022: "Network Aspects (NA); Universal Personal Telecommunication (UPT); ETSI work programme for Phase 2 UPT".
- [7] RACE Project Mobilise R2003: "Personal Services Communication Space (PSCS) Concept: Definition and CFS, Part 1 the PSCS Concept".
- [8] ITU-T Recommendation F.851: "Universal Personal Telecommunication (UPT) Service Description (Service Set 1)".

### 3 Definitions, symbols and abbreviations

#### 3.1 Definitions

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

**enabling tasks:** Are that group of tasks that it is essential to complete correctly in order for users to achieve their goal tasks. For example, to achieve communication with another user it may be necessary to set up a call (go off-hook, select the appropriate teleservice, dial a number, listen to the call progress tones, etc.).

**entities:** Used in this ETR as a common expression to refer to both the concrete and abstract concepts or components (such as user, service provider, terminal, interface, etc.) that form part of the UPT interaction model.

**goal tasks:** Are that group of users' tasks which are their real objectives. For example, the communication objective that a user is trying to achieve, such as talking to another user/subscriber to agree on a meeting date, is that user's goal task. They can be distinguished from enabling tasks.

**scenarios:** A descriptive illustration of a typical user activity within a telecommunications environment, in this case the UPT service. A scenario may be composed of a number of user tasks, both goal and enabling tasks and sub-tasks.

**subscriber:** The user or collection of users who has made arrangements with a network provider to have connection with a telecommunications network and who may make arrangements for the provision of telecommunications services via that network with a service provider. Within this report a distinction is made between an ordinary subscriber and an UPT subscriber (see subclause 5.2).

**terminals:** Are physical devices which interface with a telecommunications network and hence to a service provider to enable access to a telecommunications service. Within this ETR a terminal also provides an interface to the user (or subscriber) to enable the interchange of control actions and information between the user and the terminal, network, or service provider.

**UPT access device:** Is a physical device intended to facilitate the UPT user's (and subscriber's) interactions with the UPT service, i.e. to help the UPT user to carry out the defined UPT procedures, and to maintain the security level while doing so (see ETR 055-1/10 [2]). No distinction is made in this ETR between different possible implementations of the UPT device (magnetic strip card, modem, smart card, Dual Tone Multi-Frequency (DTMF) signalling device, etc.).

**usability:** Is the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals (tasks) in a particular environment, see ETR 116 [4]. In telecommunications usability also includes the concepts of learnability and flexibility; and reference to the interaction of more than one user (the A and B parties) with each other and with the telecommunications system (see ETR 095 [3]).

**user:** The person who uses a telecommunications terminal to gain access to, and control of, a telecommunications service. The user may or may not be the person who has subscribed to the provision of the service and may or may not be a person with special needs, e.g. elderly or disabled. Within this ETR a distinction is made between an ordinary user and an UPT user (see subclause 5.2).

**user interface:** The physical interface through which a user communicates with a telecommunications terminal or via a telecommunications terminal to a telecommunications service. The communication is bi-directional in real time and the interface includes both control and display elements.

**user procedure:** Comprises a sequence of user control actions and equipment display indications targeted to enable completion of a user's task or sub-task.

**user requirements:** Are demands put on a user by a telecommunication service (in this case the UPT service) and any of its supporting components, terminals and interfaces; and the needs or desires of a user in order to make use of the service (UPT) in the easiest, safest, most efficient and most secure way.



### 3.2 Symbols

For the purposes of this ETR the symbols used within the Specification Description Language (SDL) figures included in annex B, are defined in CCITT Recommendation Z.100 [1].

### 3.3 Abbreviations

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

CFB	Call Forwarding Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLI	Calling Line Identification
DTMF	Dual Tone Multi-Frequency
FFS	For Further Study
ISDN	Integrated Services Digital Network
MMI	Man-Machine Interface
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
RACE	Research and development in Advanced Communications technologies in Europe
SDL	Specification Description Language
STD	State Transition Diagram
UPT	Universal Personal Telecommunications

## 4 User requirements and service functionality

It is not within the scope of this ETR to consider which, if any, users' requirements are relevant for standardization. The objective of the ETR is simply to prepare a list of users' requirements. In addition to contributing to a good user interface and enhancing usability, they may then be used to assess the completeness of the functional provisions that are being defined for the UPT service.

This assessment may be accommodated within a simple matrix, and has been termed a "functionality matrix", shown in table 2. The functional provisions may be described at any of the planned phases/levels of the system, i.e. Phase 1, Phase 2, etc., and/or for each type of component UPT service profile, connectivity provision, access provision, UPT terminal, UPT access device, and compared with the defined user requirements. An analysis will then consider how well each of the users' requirements is met by the planned functionality. The analysed decision marked in any cell of such a matrix can then be indicated, at one of a number of different levels. One such basis for the evaluation can be assigned a simple key to indicate whether:

✓✓	=	the functional provision meets the user requirement in full
✓	=	the functional provision meets most aspects of the user requirement, but could be improved
0	=	the functional provision meets few aspects of the user requirement and should be improved
x	=	no functional provision exists for the user requirement
xx	=	the functional provision actively works against the user requirement

**Table 2: Example functionality matrix**

User Requirements	Functional Provision			
	Global satellite network	Unique identity for all users and subscribers	Twenty-five digit numeric identity formats	English language voice prompts/ display messages
Universally available	✓✓			
Personal user identities		✓✓	✓	
User preferred languages				xx
Easy to distinguish/ comprehend user identity			xx	

**4.1 UPT implementation phases**

The proposed implementation phases planned for the introduction of an UPT service are defined in ETR 055-1/10, Part 2 [2]. These are listed in the following subclauses.

**4.1.1 Phase 1 - restricted UPT service**

Restricted service due to limitations arising in networks, services, security and **user friendliness**. An unspecified subset of the core feature specified in ETR 055-1/10 [2]. These include:

- InCall registration;
- Outgoing UPT call set-up;
- OutCall registration;
- AllCall registration;
- Linked registration;
- UPT service profile interrogation;
- UPT service profile modification;
- Secure answering of incoming UPT calls;
- Intended recipient identity presentation;
- Follow-on facility for UPT procedures;
- UPT-specific announcement.

No core features are designated for optional implementation.

NOTE: The original reference to user-friendliness.

**4.1.2 Phase 2 - basic UPT service**

All core features are categorised as essential for implementation of this phase. Long term additional features are optional.

**4.1.3 Phase 3 - enhanced UPT service**

All core UPT features are essential and the additional features either essential or optional, as yet unspecified.

**4.2 Functionality matrix analysis**

A detailed analysis of the proposed UPT service functionality defined so far in ETR 055 [2] and other UPT documents, using such a matrix format, is not yet possible, because the so-called features, or functional provisions are not comprehensive. Others may be implied or embedded in the service descriptions and still others may be under consideration or will be implementation dependent, and these concepts will need to be developed before a full assessment can be made as to fulfilment of user requirements.

It is not possible, or appropriate, within limited resources to ascertain what service providers intend. However, it is possible to give a first appreciation of areas where usability may be compromised or the service enhanced before the detailed standardization/specification stage is completed. What has been attempted is an item-by-item assessment of the users requirements as to its supporting UPT functionality, as known at this time. This is dealt with in clause 6.

It should also be possible for the work groups in Network Aspects Technical Committee and other Technical Committees (including Sub Technical Committee 1 - Human Factors (STC-HF1)) to carry out the more detailed analysis later, based on the functionality as it emerges, and on their technical knowledge and expertise. Service procedures, service features, supplementary services, security mechanisms, terminals, and access devices are all candidates for such an analysis.

## 5 Users, tasks and interaction scenarios

### 5.1 Introduction

In order to document the user requirements for a UPT service, it is important to consider and define the user requirements in an appropriate context. Generic requirements exist for all human users and are comprehensively described in the general human factors and psychological literature. For general background information see ETR 116 [4]. In the context of UPT, users' requirements are best considered in relation to a framework or model. Figure 1 presents such a model of the UPT world and shows some of the interactions between the different users and other components, collectively referred to as entities.

The main entities in the UPT interaction model are human users, abstract components such as service profiles, networks and their interfaces, and other, physical devices and the interfaces they present to the users, such as access devices, telephones and other terminals.

User requirements are also very much dependent on the tasks that users are required to carry out or set for themselves. These requirements may then be related to system issues, or user interface issues, which should be taken into account in the functionality defined for the service.

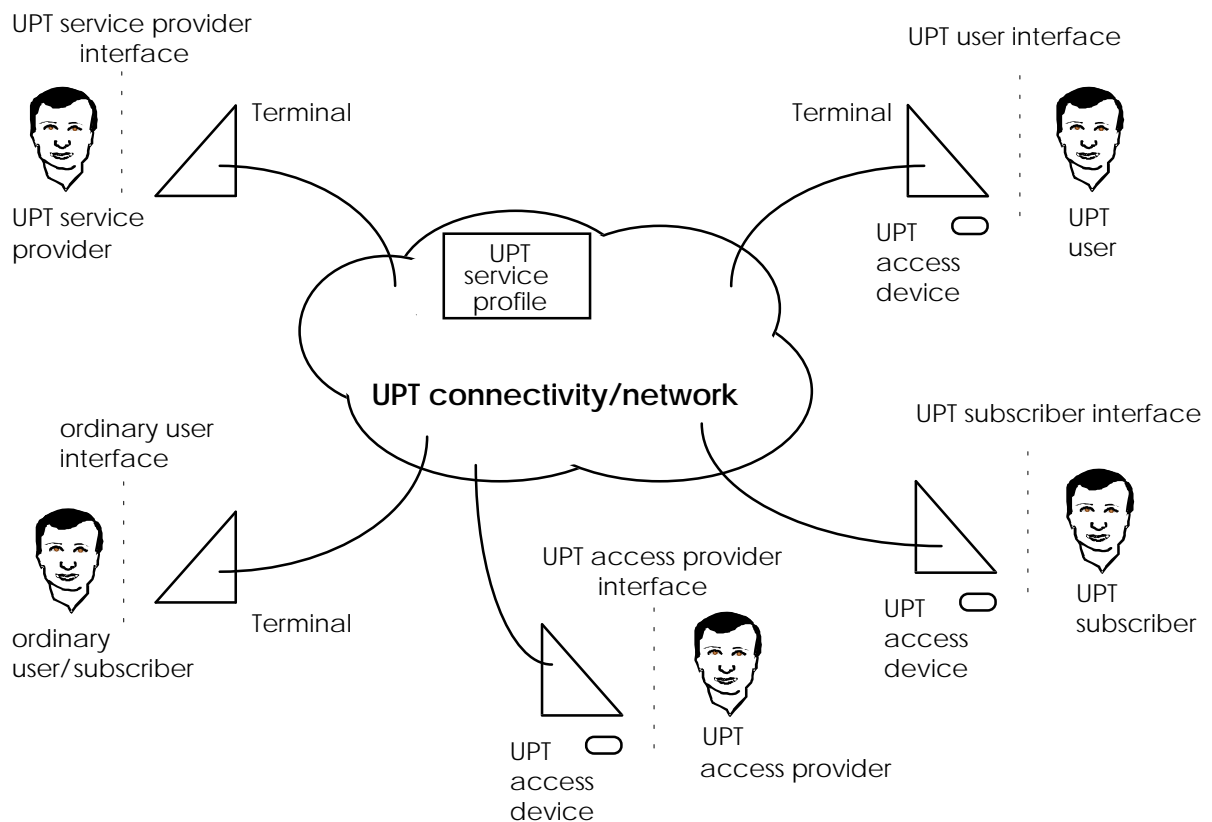


Figure 1: Entities in the UPT interaction model

## 5.2 Entities in the interaction model

### 5.2.1 The users involved in UPT

Before ascertaining their requirements it is necessary to define the users who will be involved with a UPT service. For the purposes of this ETR seven type of users are defined who will have an interaction with the UPT service and with each other. These seven users are:

- UPT user;
- UPT subscriber;
- ordinary user;
- ordinary subscriber;
- UPT service provider;
- UPT access provider;
- UPT connectivity provider.

**The UPT user** is the individual who is the primary user of the UPT service. They are the people trying to make and receive calls to/from other UPT users/subscribers and ordinary users/subscribers or their terminals. In some cases there may be only a machine (e.g. an answering machine, fax machine) on the UPT user's side. This situation will not be covered explicitly in this ETR.

**The UPT subscriber** is the individual or organisation subscribing to a UPT service. They may or may not be the same person as the UPT user. Their principle concerns are the allocation of services and the itemised billing charges of the UPT service they and the UPT users linked to them are using.

**The ordinary user** is the individual who is a non-UPT user or subscriber who has to interact with the UPT service. For example, by trying to call a UPT user or by using a terminal where a UPT user has registered. As in the case of the UPT user, a human user may not be present on the ordinary user's side, e.g., there may be a fax machine or other terminal. An ordinary user may also act as an UPT access provider on behalf of an ordinary subscriber.

**The Ordinary Subscriber** is the individual or organisation subscribing to the terminal access where an ordinary user or Subscriber may interact with a UPT user. Their principle concerns are for any costs incurred because of that interaction. An Ordinary Subscriber may also act as an UPT access provider.

**The UPT service provider** is the organisation providing the UPT service. They are normally the holder of the UPT service profile for the UPT subscribers and Users.

**The UPT access provider** is an organisation or individual (who may be an Ordinary or UPT subscriber) who provides an access point or terminal to a network, to enable interaction with the UPT service.

**The UPT connectivity provider** is the organisation/s which is providing the fixed or mobile network/s providing the possibility for connection to a UPT service and other users.

These seven users have been extrapolated and expanded from the definitions of UPT users provided in ETR 055 [2] and RACE Project Mobilise [7]. These different definitions of UPT users are compared in table 3.

**Table 3: Comparison of defined UPT users**

This ETR	ETR 055	RACE Mobilise
UPT user	UPT users	UPT end-users
UPT subscriber	UPT subscribers	UPT subscribers
ordinary user	Third parties	
ordinary subscriber	Third parties	"Access providers"
UPT service provider	UPT service providers	UPT service providers
UPT access provider	Third parties	Access providers
UPT connectivity provider		Connectivity providers

## 5.2.2 The other components involved

The other components identified in the interaction model in figure 1 are:

- UPT service profile;
- UPT access device;
- UPT and Non-UPT terminals;
- UPT and Non-UPT user interfaces;
- UPT connectivity/network.

**The UPT service profile** is a record containing the information related to a UPT subscriber and any associated UPT users, and the rules for handling the UPT subscriber's/user's mobility. It is an important entity since the contents of this record will effect the result of many users' actions, originating from outgoing and incoming UPT calls.

**The UPT access device** is a personalized physical device which a UPT user can use in combination with a UPT or non-UPT terminal to perform certain actions, automatically, which have to be performed to use the UPT service. This can, for instance, be access identification and authentication.

**UPT terminal** is a physical terminal with features which aid the UPT user when using the UPT service. It may be a special terminal which may or may not require a UPT access device, such as a smart card. Alternatively, it may consist of an ordinary telephone and a UPT access device which can generate DTMF signalling. In this ETR no distinction is made between different implementations of the UPT terminal.

**UPT and non-UPT user interfaces** are the physical interfaces provided for the input of control actions by the user and the display of information by the terminal, access device, network or UPT service. These user interfaces may be the simple 12 key key-pad, tones and spoken messages of an ordinary telephone or be the user interface of any other type of telecommunications terminal, or even the mouse, keyboard, display and loudspeaker/s of a computer terminal. In all its forms, the user interface is the user's window to the UPT service.

**UPT connectivity/network** are the telecommunications network(s) that provide connection to a UPT service, and to UPT and ordinary subscribers/users.

## 5.3 User tasks

The second consideration, after definition of the entities involved, necessary for analysis of the UPT interaction model is an appreciation of the tasks the users wants to accomplish within an UPT service. The key purpose is to understand the user's focal point. When they are using a UPT service the users' essential objectives or "goal tasks" are communication related. The tasks or procedures that need to be done to achieve these goals or make their achievement easier are not the principal motivation for using the service. They are quite simply "enabling tasks" and as such they should cause minimal obstructions and interference to the user's goals.

Some of the primary and secondary goal tasks for the defined users of the UPT service are expanded below.

### 5.3.1 UPT users

The UPT users primary goal tasks are:

- a) To initiate dialogues, and or send messages to known people (UPT and ordinary users), by making outgoing telecommunications calls:
  - from any supporting terminal/network (public or private) at any geographical location;
  - with secure knowledge that:
    - all calls will be charged to correct account;
    - no unauthorized call will be charged;
    - calls will be person to person and private;
    - most efficient routes will be used, e.g. a "local call" will be made when both parties are "local", even if one or both are roaming;
    - call billing will match published charges, and not include "surprises".

- b) To accept dialogues and or messages from known and unknown people (UPT and ordinary users) by receiving incoming telecommunications calls:
- at any supporting terminal/network (public or private) at any geographical location;
  - with secure knowledge that:
    - calls will be person to person and private;
    - minimum cost routes will be used for any incoming calls bearing charges;
    - no unauthorized calls bearing charges will be charged;
    - unwanted calls do not have to be answered, particularly when roaming.

The UPT users secondary goal tasks are:

- a) To feel in control of their telecommunications environment:
- by giving other choices than having to answer intrusive calls;
  - by maintaining contact when away from home terminal/network;
  - by maintaining communications capability when away from home terminal/network.
- b) To control their communications availability:
- by choosing when available to whom, without losing calls from unexpected sources.
- c) To control their telecommunications costs:
- by separating business, personal, and other call charges;
  - by identifying individual users costs;
  - by minimising UPT on-costs, e.g. when roaming.

### 5.3.2 UPT subscribers

Primary goal tasks are:

- a) To provide the required UPT service environment for the UPT users associated with their subscription. This includes:
- UPT identities, permitted registration, mobility, etc.;
  - UPT supplementary services.
- b) To monitor the usage of the UPT services provided for the associated users:
- to be aware of "goodness of fit" between the service provision and the user's needs.
- c) To monitor and control costs applicable to the subscription:
- to balance UPT costs against the UPT user's needs.

Primary and secondary goal tasks for other UPT service users may be derived in a similar way.

### 5.4 Interaction scenarios

Usability in telecommunications is invariably a special case, as it typically involves more than one user interacting with the various levels of the system and with each other, in real time (see ETR 095 [3] and ETR 116 [4]). Therefore, to determine the users' requirements fully, it is necessary to explore the possible user interactions, not just with the system or service, but with each other. The possible interactions between the seven type of users defined as relevant to the UPT service are shown in table 4.

- Those interactions which are essential to the analysis are marked with a tick: ✓
- Those that are considered essential but are outside the scope of this ETR are marked with a tick and the letters OS in brackets: ✓(OS)
- Those where the relevance is not apparent are marked with a question mark: ?
- The remainder are marked with a cross, as these interactions are not thought to be relevant: ✗

Table 4: Interaction between users in an UPT service

	UPT user	UPT subscriber	Ordinary user	Ordinary subscriber	UPT service provider	UPT access provider	UPT connectivity provider
UPT user	✓	✓	✓	✓	✓	✓	✗
UPT subscriber	✓	✗	✗	✗	✓	✓	✓
Ordinary user	✓	✗	✗	✗	✓	✓	✗
Ordinary subscriber	✓	✗	✗	✗	✓	✗	✗
UPT service provider	✓	✓	✓	✓	✓(OS)	✓(OS)	✓(OS)
UPT access provider	✓	✓	?	?	✓(OS)	✗	✗
UPT connectivity provider	?	✓	✗	✗	✓(OS)	✗	✗

Within any of the above interactions between two or more of the users involved in UPT there will need to be a reference to one or more of the other components in the model. For example, an interaction between a UPT user and another UPT user necessarily involves the following entities:

UPT user A

- UPT user interface
- UPT terminal/access device
- UPT service profile

UPT connectivity/network

- UPT service profile
- UPT terminal/access device
- UPT user interface

UPT user B

The way that interactions take place and any constraints placed on the user by them or by any of the intermediary components, e.g. by a user interface or service profile, will materially affect usability.

To explore the potential impact of the user to user interactions a number of scenarios was developed. The purpose of these scenarios is to describe situations which may occur when the entities in the user interaction model interact through the UPT service, and to identify potential problem areas.

The following interactions are explored in more detail:

- between the UPT user and another UPT user (see subclause 5.4.2);
- between the UPT user and a UPT subscriber (see subclause 5.4.3);
- between the UPT user and the ordinary user or subscriber (see subclause 5.4.4);
- between the UPT user and the UPT service provider (see subclause 5.4.5);
- between the UPT user and the access provider (see subclause 5.4.6);
- between the UPT subscriber and the UPT service provider (see subclause 5.4.7);
- between the access provider and the UPT service provider (see subclause 5.4.8).

The requirements which are identified through analysing these scenarios are listed in clause 6, as well as a subjective rating of their importance for usability of the UPT service.

Some of the user procedures necessary to support these scenarios are defined in ETR 055-1/10 [2]. They have been incorporated into SDL diagrams for the purpose of exploring more fully the interactions and any implications for the user. They do not assume any particular implementation, nor do they fully define the

user procedures, control actions, and system indications that should be applied in any phase of UPT. The SDL diagrams are presented in annex A.

#### 5.4.1 Personal mobility states

Before exploring the interactions scenarios in detail it is useful to understand the different mobility states currently defined for which a UPT user can register. According to part 7 of ETR 055-1/10 [2], the UPT user has to be in one of a number of personal mobility states, defined as follows:

- State 0: **DETACHED** deregistered for incoming calls, deregistered for outgoing calls;
- State 1: **READY\_TO\_CALL** deregistered for incoming calls, registered for outgoing calls;
- State 2: **REACHABLE** registered for incoming calls - further authentication required, deregistered for outgoing calls;
- State 3: **READY\_TO\_ANSWER** registered for incoming calls - no further authentication required, deregistered for outgoing calls;
- State 4: **ATTACHED** registered for incoming calls - further authentication required, registered for outgoing calls;
- State 5: **READY\_FOR\_ALL** registered for incoming calls - no further authentication required, registered for outgoing calls;
- State 6: **LINKED** the same as **READY\_FOR\_ALL**, but with linked registration for incoming and outgoing calls.

#### 5.4.2 UPT user and UPT user

Two situations are reviewed in which the UPT user interacts with another UPT user:

- The UPT user is making a call to a UPT user;
- The UPT user is receiving a call from a UPT user.

##### 5.4.2.1 Making a call - UPT user to UPT user

If the A-party is registered as **READY\_TO\_CALL**, **ATTACHED**, **READY\_FOR\_ALL** or **LINKED** at a UPT terminal with UPT access device attached, then making a UPT call set-up should be no different to setting up an ordinary call on an ordinary terminal. If the UPT access device is unattached then a suitable prompt for attachment may be required.

If the A-party is registered as **DETACHED**, **REACHABLE**, or **READY\_TO\_ANSWER** at a UPT terminal, then before a UPT call set-up can be made a change in registration is required. This seems a cumbersome process.

Where a UPT user is registered at least in part, i.e. is **REACHABLE** or **READY\_TO\_ANSWER**, it may be desirable, if the user can be registered for outgoing calls, that the call set-up is initiated and for the service to request per call authentication before call set-up is completed. If the user is not allowed outgoing call registration then a suitable indication should be given.

Where a user is totally unregistered, i.e. **DETACHED**, the terminal, should prompt for registration. The type of prompting and the extent of guidance offered to the user will be dependent on the terminal, and the UPT access devices it is prepared to accept. The minimum might be a simple voice prompt to, "Please insert your smart card".

If call completion requires B-party authentication or change of registration this may incur an appreciable delay at the alerting phase, in which case the A-party may require a confirmatory indication that all is well, i.e. "Awaiting authentication please wait".



If the B-party is not reachable (because they are not appropriately registered or they fail authentication), the A-party should get an indication which confirms this state. It is then at the service provider's discretion, with due reference to the A-party's service profile, to offer alternative services to facilitate call completion. These might include:

- a voice mail box, if the B-party subscribes to one;
- a missed calls log, if the B-party subscribes to one;
- a call back when free service, if the A-party subscribes to one;
- etc..

If the B-party is busy or rejects the incoming call for any reason (e.g. he is not prepared to pay the UPT on-costs associated with the call), the A-party is expected to receive the standard busy indication, unless the B-party subscribes to UPT supplementary services such as Call Waiting, Call Forward on Busy, etc. On receipt of a busy indication, it can again be at the service providers discretion to offer call completion services to the A-party.

If two or more call completion options are available then the A-party should be given a choice and an indication of any charges. They may also be able to define their preference within their service profile.

If the A-party wishes to make a second call two situations are considered:

- the user can go on-hook and then start a new call, in which case if authentication was a requirement on the first call then it should also be required on the second call;
- the user can signal a follow-on call or invoke a supplementary service, i.e. hold and then send an address, in which case no further authentication should be expected even if it was a requirement on the first call.

#### **5.4.2.2 Receiving a call - UPT user to UPT user**

If the B-party is registered as REACHABLE or ATTACHED, they will receive an alerting signal, an indication of the calling party (if it can be displayed) and a prompt for authentication before the connection is completed.

If the B-party is registered as READY\_TO\_ANSWER, READY\_FOR\_ALL or LINKED, alerting will be followed after acceptance by connection just as an ordinary call would be.

If the B-party is registered as READY\_TO\_CALL, no alerting signal will be given and a suitable indication returned to the A-party (unreachable). However, it may be desirable, as a user option if the user's profile allows registration for incoming calls, for the alerting signal to be presented with a request for authentication.

If the B-party is registered as DETACHED, no alerting signal can be given and a suitable indication returned to the A-party (unreachable).

In all cases:

- if there are charging implications for the B-party, i.e. UPT on-costs when roaming, then a further indication may be given as a user option, with the possibility to refuse the call;
- if there are multiple registrations at the B-party terminal then an additional indication, the identity of the called party will be necessary especially if authentication is required.

Irrespective of the registration, if an alerting signal is answered by an unauthorized user (ordinary or UPT) and authentication cannot be successfully completed then a suitable indication should be returned to the A-party and the connection is not completed. If no authentication is requested then the call is open.

### 5.4.3 UPT user and UPT subscriber

The interactions between the UPT user and the UPT subscriber are concerned with the status of the UPT user's UPT service profile, and the costs incurred through the UPT user's usage of the service. Two situations are reviewed:

- the UPT user wishes to modify his UPT service profile and for various reasons requires the UPT subscriber's agreement;
- the UPT subscriber wishes to modify the UPT user's service profile.

#### 5.4.3.1 The UPT user modifies his service profile

In this case the UPT user first has to be able to review his existing service profile, before he can decide on any necessary changes. This review and the method by which it is achieved will depend on the extent/complexity of the service profile and the type of terminal available. ETR 055-1/10 [2] currently lists 27 parameters that the UPT user can affect (see subclause 5.4.5).

Even in the simplest case, the UPT user may need to confirm his identity, the current state of his registration and any limits that apply to his registration (e.g. incoming calls without authentication, outgoing calls with authentication) and/or mobility (e.g. home area only, home country only, European countries only, etc.) and/or charging credit. In more complex cases he may require to change time/date information linked to registrations or identities (e.g. times available for home/personal calls, times and call areas available for business calls), supplementary and value-added services associated with UPT identities (voice mail box for business call, missed call log for personal calls), black and white lists of callers associated with UPT identities (e.g. white list of personal relatives/friends who can get through at any time; black list of business colleagues who always get the voice mail box;). The list is extensive.

Wherever any change has an effect the charges that will be billed to the subscriber there is the possibility that the subscriber may wish to confirm the change before it is implemented. Two situations are considered, when the change is performed on-line or off-line:

- if the change is to be implemented on-line, then the UPT user needs a significant display facility to be able to review the existing status and choices of all the service profile options, particularly if black and white calling party lists are involved. There may also be the need for some form of user/subscriber messaging facility to record, confirm and process the change requests;
- if the change has to be implemented off-line then the UPT user requires a printed statement of his existing service profile together with information on the range of choices available for each possible change and their cost and practical implications. Any change requested will now be subject to the normal problems of clerical and human interaction, and may be outside the scope of the UPT service.

#### 5.4.3.2 The UPT subscriber modifies the UPT user's service profile

The situation where the UPT subscriber modifies the UPT user's service profile is only slightly less complex. Quite obviously there is still the same requirement for a full display of the service profile status and the available options, irrespective of whether this is on or off-line. The ETR 055-1/10 [2] lists 9 parameters that a UPT subscriber can change (see subclause 5.4.7), these are in addition to the 27 available to the UPT user (see subclause 5.4.5).

Following any changes that will affect the mobility and/or other service aspects of the UPT user these will need to be indicated to the UPT user at his current or next point of registration, and preferably before he attempts to make use of them. The UPT user may also request a right of appeal against the changes instigated by the subscriber. In which case the situation is similar to the scenario in subclause 5.4.3.1 where the UPT user wants to modify a parameter that the subscriber controls.

#### **5.4.4 The UPT user and the ordinary user or subscriber**

Three situations are reviewed in which the UPT user and the ordinary user or subscriber interact.

- the UPT user is calling the ordinary user;
- the ordinary user is calling the UPT user;
- the ordinary user is calling the ordinary subscriber, but as a UPT user is registered ends up connected to a UPT user.

##### **5.4.4.1 UPT user calling an ordinary user/subscriber**

An ordinary user or subscriber who receives a call from a UPT user should not notice any difference from any other ordinary call.

##### **5.4.4.2 Ordinary user calling a UPT user**

When an ordinary user calls a UPT user, there may be certain problems:

- there may be charging implications for the ordinary user, and if so, these should be indicated either in published material and/or at the point of call by the UPT service provider;
- the UPT user may be registered as DETACHED or READY\_TO\_CALL, and in this case, depending on the UPT service profile set-up, the ordinary user's call may be routed to an answering service, a voice mailbox, etc. This may happen even if the UPT user is able to receive calls. For example, if the UPT service profile is set up to receive calls only from certain callers (call screening with a black or white list);
- if the UPT user is in the REACHABLE state, or the ATTACHED state, where an incoming call requires further authentication by the UPT user, this will have an effect on the ordinary user. The authentication procedure may take some time to perform, and if there is a significant delay this may be unacceptable to the ordinary user unless feedback is provided;
- if several UPT users have registered on a single UPT terminal for incoming calls further problems may occur:
  - if the UPT users have registered with secure answering there may be a significant delay, even if the authentication procedure itself may be invoked with a single action. The delay is introduced to the ordinary user because unless the alerting signal clearly indicates who the call is for, several users may try to authenticate to receive the call. However, as individual users with long term registration may find this annoying this feature should be user selectable and is therefore to be considered further;
  - if the UPT users have registered for incoming calls with no further authentication required an ordinary user phoning one of these UPT users may end up with any one of the registered users.

##### **5.4.4.3 Ordinary user calling an ordinary user/subscriber**

When an ordinary user calls another ordinary user or subscriber the UPT service is not effected, except when the one of the parties is also acting as an UPT access provider.

If the A-party is using an ordinary or UPT terminal with an active UPT registration, then he should still be able to make ordinary calls in the normal way for that terminal. There should be no effect on the UPT service, and no change in the ordinary call set-up procedures for that terminal invoked because of the UPT registration, and no change to the normal billing of ordinary calls to that terminal's subscriber. If it occurs that a UPT terminal makes no provision for ordinary calls this should be obvious from the design of the terminal and/or its user interface.

If the B-party is using an ordinary terminal or a UPT terminal with an active UPT registration, then irrespective of the state of the UPT registration, the call should proceed. An indication may be given on or by the terminal that the arriving call is an ordinary call, e.g. the acoustic alerting signal from that terminal

may differentiate in some way between ordinary and UPT calls. Additional indications on identity of the calling party and the identity of the called party may also be given. If the call is answered by the registered UPT user then interaction with the actual called party is normal social interaction, or perhaps by call transfer if that is more appropriate.

#### 5.4.5 The UPT user and the UPT service provider

The UPT user interacts with the UPT service provider primarily with respect to the UPT user's service profile. The 27 parameters listed in ETR 055-1/10 [2] available to the UPT user are:

- Service related:
  - request of authentication by the UPT user for incoming calls;
  - type of authentication procedures activated;
  - specific confidentiality requirements, if any (e.g. restrictions on disclosure of current terminal accesses);
  - restrictions on permitted callers, if available (e.g. white lists, UPT and ordinary callers who will be specifically permitted, and black lists, UPT and ordinary callers who will be specifically not permitted);
  - customized announcements;
  - type of charging options activated;
  - type of security options activated;
  - activation status for each supplementary service (irrespective of their initial source Public Switch Telephone Network (PSTN), Integrated Services Digital Network (ISDN), Public Land Mobile Network (PLMN), UPT, etc.);
  - preferred language for UPT specific announcements;
- Mobility related:
  - temporary home location;
  - default terminal accesses for incoming calls;
  - default terminal accessed for outgoing calls;
  - default terminal accesses for linked registration;
  - list of terminal accesses for remote registration;
  - default duration (or number of calls) for registration, for incoming calls;
  - default duration (or number of calls) for registration, for outgoing calls;
  - default duration (or number of calls) for linked registration;
  - variable routing parameters:
    - routing by call originating area;
    - routing by calling line identity (if applicable);
    - time dependent routing (by day of week, day of year, time of day, etc.);
    - routing by "on busy" condition (network determined or user determined?);
    - routing by "no answer" condition (or not reachable?);
  - whether or not a simplified authentication procedure should be used for outgoing UPT calls during registration for outgoing calls;
  - whether or not any other UPT user should be allowed to deregister the UPT user for outgoing calls from a terminal access by override.
- Modified by personal mobility procedures only:
  - current terminal accesses for incoming calls;
  - current terminal accesses for outgoing calls;
  - current terminal accesses for linked registrations.

The UPT service profile is the most important UPT service entity. It provides the UPT users and subscribers with total control over their day-to-day and longer term UPT communications. Two situations are considered:

- the UPT user's interaction in basic registration;
- the UPT user's interaction in service profile management.

#### 5.4.5.1 Interaction in basic registration

The UPT user maintains his access to UPT communications through registration with the UPT service. Each time the user wishes to register with or log in to the service, a number of data items need to be exchanged. These include:

- UPT access (address, number or code), this enables the terminal to set up a call to the UPT service to which the UPT user has subscribed;
- UPT identity, this enables the UPT service to identify the user calling the service;
- UPT authentication, this enables the UPT service to verify the identity of the caller;
- UPT procedure or registration request, this enables the UPT user to select the UPT service required.

If these data items have to be entered manually, either as a single command string (a sequence of data items, digits, symbols and/or characters, with or without separators and pauses) or via an interactive dialogue (sequence of prompts and control/data inputs) through the terminal to the service provider, significant user errors are bound to occur.

As far as possible this basic registration process should be automated. The most the UPT user may be expected to tolerate is:

- to attach a UPT access device to a UPT compatible terminal; and
- to enter some limited authentication data, for example a Personal Identification Number (PIN) or a password.

This level of user intervention in the registration process assumes that the UPT access device has the remaining information, and that it is transferred to the terminal and on to the service provider on attachment. This will include the default value for the preferred personal mobility state (see subclause 5.4.1).

It would be even better if the security procedures could be fully automated and did not have to rely on a UPT user's memory, for an abstruse numeric code, or a personally relevant data item (a family birth date, previous home address, etc.). The use of such security confirmation checks is proliferating significantly and their degree of security versus the user's poor memory should be in time be compromised.

Whatever procedures or security mechanisms are devised to support the user's basic registration, the user will require adequate prompting either in the published material supporting the service and/or at the terminal and/or in the user interface dialogue to know:

- how, when and where to attach the UPT access device;
- how and when to enter any UPT access/identification/authentication data;
- how to accommodate errors in data entry;
- how and when to enter the choice of UPT procedure/registration.

The UPT user will also want to know that the service data transferred is secure and confidential. There are significant opportunities for the data's integrity to be compromised as it passes from the access device, via the terminal, access provider and the intervening networks to the service provider. If there is any suspicion of such a compromise the UPT user should be informed as soon as possible and assured that the subscription will not be billed for any unauthorized charges.

After making the initial registration at a location, further registration/s or authentication will depend on several conditions:

- if the user is using a personal terminal (e.g. a portable phone) or a secure terminal or a terminal in a secure environment (e.g. at home or office), no further registration or authentication should be necessary, even if the terminal is unattended for a considerable time, unless:
  - the UPT access device is detached for any reason;
  - a level of call barring is established.

- if the user is using an open or insecure terminal (e.g. in a hotel, or semi public place) then first it is up to the user to ensure the security of his registration. For example, by removing his access device after each outgoing call, or when leaving the room the terminal is in, and/or by varying his registration to request per call authentication. Second, it will be for the UPT service or terminal to provide some mechanisms to support the user's security. For example, by making the access device in two pieces one of which may be attached to the terminal and the other remaining "attached" to the user, or by ensuring that the terminal will not accept levels of registrations that do not require further authentication especially for outgoing calls and incoming calls with UPT on-costs, or by the use of time-outs even if an access device is still attached . All of these aspects will require the design of good user interfaces and are obviously for further study;
- if the user transfers and registers at a new terminal;
- if a UPT user/subscriber accidentally or intentionally forces the user to become deregistered, e.g. by registering at a terminal which only allows one registration at a time;
- if an UPT access provider or service provider accidentally or intentionally deregisters the user, for whatever reason;
- if the UPT subscriber, access provider or service provider request it;
- if the calling or called party request it.

In the last four cases above, the UPT service should give the user an adequate prompt (acoustically and/or visually) to provide the requested data and adequate error correction procedures, prompts, and help for miskeyings, etc..

#### 5.4.5.2 Interaction in service profile management

In contrast to the UPT user's common requirement to interact with his UPT service profile as part of registration, from time to time he will need to interact for the purposes of service profile management. In fact another service user may even require the interaction, for example:

- a UPT service provider may request an authentication data update (change of PIN/password);
- a UPT subscriber may have made a change of service credit;
- a UPT access provider may have forced a change of registration at a default access point.

The level of interaction that a UPT user initiates will depend on several factors:

- the complexity of the interaction task. Acknowledging a deregistration may be very simple, but editing a black/white list used for call screening or filtering, may not be;
- the opportunities available at the user interface at which he is currently registered. His current terminal may not have a visual display, or it may be very limited in memory, or it may be too insecure, etc.;
- the complexity of the service profile.

In addition to making basic changes to the service profile database, the user may also want additional support. For example:

- the ability to request clearance for a change from his subscription holder;
- the ability to test/review the impact of a change to a call screening service, e.g. where do calls from party X end up, if the user is at home, at work, or roaming.

In addition to managing his service profile a UPT user may also wish to interact with the records of his UPT calls, both incoming and outgoing, successful and unsuccessful. For legitimate reasons a user may wish to:

- verify the cost of a particular call;
- check a previously called parties identity;
- review the additions to a missed calls list, etc.;

Indeed he may even wish to be able interact between the service profile and his call records, e.g. for the purpose of copying a call identity to a call screening list.

With this level of complexity with the interactions between the user and his service profile and call records, there is a significant requirement to ensure that the user is adequately protected from fraudulent access. There may well be additional security procedures necessary to allow users to access these interactions. For example, access may be restricted to certain terminals or access points, and may be to certain times of day, etc.

The user interface and user dialogues necessary to support these types of interactions between a UPT user and his UPT service provider may vary considerably. From the basic of using a function key (to redial the last UPT identity called); to the supposedly simple use of command strings (like keying \*61\*00339294# to change a supplementary service state); to the complex use of menus, dialogue boxes and forms (to create/edit black and white lists, modify default registration states, etc.). Consequently, the specific user requirements for any form or interface or for any specific interaction have to be for further study.

However, there is an obvious need for a minimum interface and dialogue to be defined in order to enable a minimal universal service and a minimal level of usability. This need should not though obstruct the considerable opportunities for different service providers to establish significant product differentiation.

#### **5.4.6 The UPT user and the access provider**

It is envisaged that a lot of the interaction between the UPT user and the UPT access provider will be normal social interactions, like establishing whether it is allowed for the UPT user to register at a particular terminal. However, there are some interactions that will require support from the UPT service or terminal. For example:

- a UPT user may be trying to register at an access where the access provider has blocked UPT registrations. The UPT user should be notified of the reason why his registration has not been accepted, and the access provider provided with procedures for controlling blocking;
- if a UPT user successfully registers, the UPT access provider, who may be an ordinary subscriber, should be provided with feedback that there are UPT users registered.

In order to protect the access provider against accidental misuse (where the UPT user leaves an access point in a registered state) of fraudulent misuse, the access provider must be given adequate procedures so that he can take control over his/her access, e.g. the minimum would be to allow the access provider to deregister UPT users.

In order to encourage access provision in some situations (e.g. hotels) where the telephone access is normally charged at a premium, there may be a need to enable this class of access providers to make a charge for the access provision. This charge could be either as a one off or on a per call basis. If it is on a per call basis then the access provider may wish to charge for both incoming and outgoing calls. It may also be appropriate to indicate these per call charges to the UPT user.

In the situation of multiple UPT registrations at an access providers terminal the number of UPT users registered should be restricted. The limits of this restriction in any one situation could be set by agreement between the service provider and the access provider. A default value may be required to accommodate the situation for ordinary and UPT subscribers acting as access providers.

In the situation of a single UPT user with multiple UPT registrations at different access provider's terminals, e.g. to receive fax, modem and voice calls, there are legitimate concerns for the UPT subscription holder on cost management in an insecure environment, particularly if there are UPT on-costs due to roaming. One solution might be to only allow one registration per teleservice, however these requirements to protect the subscription should be for further study.

Long term registration of a UPT user at an access provider's terminal is a matter for concern between the UPT subscription holder and the access provider, for reasons of cost management. If the UPT user's UPT access device has to be attached to the terminal for access or the terminal is in a secure environment there may be few concerns. However, if the UPT Access device is unattached and/or the terminal is in an insecure environment there are obviously legitimate concerns.

#### 5.4.7 The UPT subscriber and the UPT service provider

The UPT subscriber's interaction with the UPT service provider is principally related to the management of the service profiles and billing associated with the UPT users contributing to his subscription. The parameters of particular concern include:

- Fixed at subscription:
  - UPT number;
  - Personal user identity;
  - Default home location of each UPT user;
  - Bearer service subscribed to;
  - Teleservices subscribed to;
  - Supplementary services subscribed to;
  - maximum number of failed authentication attempts before disabling the UPT service profile access;
  - types of authentication procedures subscribed to;
  - security options subscribed to;
  - restrictions on remote registrations subscribed to;
  - not allowed destination prefixes for incoming calls (roaming restrictions?).
- Available for change:
  - charging options allowed;
  - profile access parameters (read/write privilege) for the UPT users;
  - any particular charging arrangements;
  - maximum allowed credit for users;
  - restrictions on roaming;
  - maximum number of terminal accesses for group registration for incoming calls;
  - maximum number of terminal accesses for group registration for outgoing calls;
  - maximum number of terminal accesses for remote registration;
  - allowed procedures for the UPT users.

The user interface and user dialogues necessary to support the interactions between a UPT subscriber and his UPT service provider may vary considerably to accommodate these and the UPT users parameters (see subclause 5.4.6). Consequently, the specific user requirements for any form or interface or for any specific interaction have to be for further study.

However, as with the UPT user's interaction with the service provider (see subclause 5.4.6), there is an obvious need for a minimum interface and dialogue to be defined in order to enable a minimal universal service and a minimal level of usability.

#### 5.4.8 The UPT access provider and the UPT service provider

The UPT access provider and the UPT service provider interact at two levels: off-line and on-line.

Off-line, where the principal concern is one of contractual arrangements for the monitoring of the usage of the UPT service access and for receiving payments for providing that access. Any one UPT access provider may have contractual arrangements with one or more UPT service providers with respect to the UPT users who may make use of his access point(s).

On-line, where the principal concern is one of direct monitoring to protect the terminal and UPT access point, and management in order to verify the service usage and billing.

The type of terminal/access point that a UPT access provider may be offering may vary considerably, including:

- a private PSTN terminal;
- a public PSTN terminal belonging to private owners or public operators;
- a PSTN PABX extension;
- an analogue cellular portable phone;
- a private ISDN terminal;
- a GSM or PCN digital cellular portable phone;
- an ISDN digital PABX extension;
- a DECT cordless phone.



Irrespective of the type of terminal providing the access there are at least two interactions that will need consideration:

- when a new UPT user registers for access at an access providers terminal the access provider may have a need for independent confirmation of the users *bona fide* status, e.g. to confirm that the service provider accepts the registration and will charge the user for the call.
- when one or more users leaves a registration active on a terminal the access provider should be able to deregister them easily, both separately and collectively.

However, to monitor and control UPT access at a large installation, where at any one time there may be a large number of registrations, will require a complex and supportive user interface. This has to be for further study.

## 6 The users' requirements

The users' requirements shown in the tables below are divided into two sets, those that are generic to the provision of a UPT service, and those that are particular to the control of a UPT service by the identified users.

### 6.1 Generic requirements

The generic requirements listed have evolved from four global UPT service objectives:

- Universal;
- Personal;
- Telecommunications;
- Usable.

**Universal** applies to both the geographic location and people to whom the service is offered. It could be critical for early success of the UPT concept that the system is designed, not just for the top 10 % of the population (in terms of their mental, physical and earning capacity), but for at least the majority of people.

**Personal** confirms the shift from a network/terminal-centric service to a user-centric service, and as such makes demands for the service to match the individuals communications requirements. These requirements are not static but change day to day, person to person.

**Telecommunications** confirms that the service should include all forms of communication, it cannot be restricted simply to telephony. The full UPT service is expected to include a variety of teleservices (telephony 3,1 kHz and 7 kHz, videotelephony, facsimile gps 3/4, videotex, teletex, etc.), a variety of supplementary services (call forwarding unconditional, call forward - no reply, call forward - on busy, call deflection, call waiting, hold, transfer, call completion on busy, user to user signalling, etc.) and value added network services (voice mail, stored voice services, etc.) file transfer, etc.

**Usable** is self-evident, at the basic level, if the system developed within the telecommunications community is unusable to a significant number of users, it will not succeed. Other communications communities (e.g. the Internet?) will learn from these mistakes.

The generic requirements extrapolated from these objectives are categorized under four headings: "access", "security", "user perception" and "user preference".

6.1.1 Access

UPT access should be world-wide, but necessarily will be dependent on the service provider, access provider and connecting provider; the availability of terminals and a successful log-on/registration. In addition UPT access should accommodate the requirements listed in table 5:

Table 5: UPT access requirements

No	Requirement	Priority	Function
1	should have a known minimum UPT service from all participating access/connecting providers.	HIGH	
2	should enable incoming and outgoing calls with UPT and ordinary users.	HIGH	
3	should support a minimum service of simultaneous bi-directional real-time telephony.	HIGH	
4	can consider a reduced service "switch to talk" and "acknowledge" service which may be of value for extreme situations.	MEDIUM	
5	should enable separation of telecommunications roles (personal/home, business/work, others as required). The UPT access device may or may not enable access to all available roles at the subscriber's discretion.	HIGH	
6	where the UPT access device does enable access to different user roles, use of the access device to access any aspect of the service should enable the user to change roles without starting the access device registration procedure again.	HIGH	
7	should enable integration of users into subscription groups (family members, business colleagues).	HIGH	
8	should enable differentiation of UPT services within and between groups.	HIGH	
9	should support preferred language messages, prompts and feedback. The preferred language should include national spoken/written languages as well as text telephony/sign language for the deaf/hard of hearing.	HIGH	
10	should not exclude people with special needs, requirements for specific disabilities are for further study, but a minimum requirement should include: <ul style="list-style-type: none"> <li>- the needs of the visually impaired with respect of control position/operation, displayed information, and terminal/access device integration;</li> <li>- the needs of the hearing impaired with respect to displayed information;</li> <li>- the needs of the dexterity impaired with respect to control operation, terminal/access device integration, and;</li> <li>- the needs of the mentally impaired with respect to the memory load (ré command sequences), the response times/time-outs (slow control actuation, displayed information assimilation), user procedures (complexity) displayed information (comprehendable, unambiguous), etc.</li> </ul>	HIGH	
11	should have a comprehensible structured UPT address which is distinguishable from the ordinary network address. This address structure could reflect the telecommunications model of Network-Local_Network-Subscriber/Terminal_Access_Point, or the e-mail/user's model of Who-Where-Where.	HIGH	

**6.1.2 Security**

The security, confidentiality and integrity of the data transmitted and recorded as part of a UPT service is essential. Specific security requirements for the UPT user are listed in table 6.

**Table 6: UPT security requirements for the UPT user**

No	Requirement	Priority	Function
12	should be confident that UPT terminals do not copy/store authentication/registration data intended to be forwarded to the service provider, that has to be entered via the terminal's interface.	HIGH	
13	should be confident of the integrity and confidentiality of data, messages, patterns of usage, etc. And that a UPT service provider, UPT connectivity provider and UPT access provider necessarily have access to while it is being transported between users.	HIGH	
14	should be confident that the privacy and security of data stored by the UPT service provider, be it voice mail, text messages, etc. cannot be accessed by unauthorized users.	HIGH	
15	should be able to set different authentication requirements per service, e.g. broadcast message to all in a group, forward message to user when next registers, require personal authentication before forwarding message.	MEDIUM	
16	should be confident that the integrity of remote registration messages are not compromised, e.g. user A can register to receive incoming videotelephone calls at another terminal.	HIGH	
17	be able to restrict Calling Line identification (CLI) for both the terminal identity and UPT user identity on a per call basis.	HIGH	
18	should be confident the access and control of the UPT service profile i.e. it is not available to unauthorized users.	HIGH	
19	should be confident of the integrity and confidentiality of the UPT service profile data whilst being transported between service providers.	HIGH	
20	should be confident of the privacy of the current location of the registered user from unauthorized users.	HIGH	
21	emergency and security services, should be able to know the users location, e.g. to provide assistance.	MEDIUM	
22	should be confident that personal authentication procedures are protecting their use and investment in the service.	HIGH	
23	should not need to be aware of automated UPT access device authentication procedures which are successful.	MEDIUM	
24	may be able to restrict some information on service usage to the UPT service provider.	MEDIUM	
25	may be able to create/edit black lists of UPT and ordinary users to prevent/limit persistent misuse, e.g. by capture/recording of CLI data.	LOW	

6.1.3 User control procedures

The user's requirements for the control procedures necessary to support their tasks within the UPT service are listed in table 7.

Table 7: UPT user control procedures requirements

No	Requirement	Priority	Function
26	comply with the simple rule "Indicate-Control-Indicate", which requires information to be available before a control action on the state of the system and of the control, and for further information after a control action on the changed state of the control and of the state of the system to be available.	HIGH	
27	as a matter of principle be flexible, i.e. to enable the users desired objective to be reached irrespective of minor differences in control sequencing, etc. For example, if three actions have to be completed in order to initiate a new state, then as far as possible it should not matter in which order the user completes the actions (e.g. lift handset, give address, select teleservice should be as good as select teleservice, give address, lift handset).	HIGH	
28	as a matter of principle minimise the users memory load, point and select is much easier than remember and type. However, the principle should not be used to prevent those users who can remember and type from doing so. The interface should be flexible in accepting different control input styles.	HIGH	
29	as a matter of principle offer simple error recovery techniques, and as far as possible these should not cause any loss of previously entered data. For example, it is frustrating to have to retype a complete data string simply because of a transposition error in the first two characters. For more complex tasks (e.g. editing the service profile) it will not be sufficient to require the user to hang up and try again.	HIGH	
30	as a matter of principle ensure any information presented is comprehensible to the target user population, i.e. given in the users preferred language (including PSN and ethnic minority requirements), jargon free, self-explanatory, concise and consistent with user expectations/stereotypes.	HIGH	
31	as a matter of principle give feedback within recommended response times, even if the feedback is simply the request to "please wait", should avoid telecommunication silence even after a wait request, and should ensure time-outs on control sequences do not inconvenience users with impaired dexterity/motor control.	HIGH	
32	meet recognized design guidelines (e.g. ETR 116 [4]) and good design practice for optimizing usability (see subclause 6.1.4).	HIGH	
33	should not require the learning of lengthy unstructured abstruse numeric/alphanumeric strings. Where coded command sequences are used they should comply with approved standardized code schemes (work is currently being undertaken within TC-HF to standardize this area under the work item DE/HF-01017: "Human Factors (HF); Minimum Man-Machine Interface (MMI) to public network based supplementary services").	HIGH	

6.1.4 Usability

This subclause is included to encourage UPT system design and development teams to implement a systematic approach to the usability assessment of the UPT service they are creating, and to integrate usability criteria into their quality assurance and design reviews procedures.

**6.1.4.1 User performance**

The UPT service should be designed to enable UPT users to meet recognised targets of user performance for critical usage tasks. These user performance targets should be applicable for all the projected user population (which should not be restricted to the affluent, intelligent, mobile, non-technology phobic). Some examples are given in table 8.

**Table 8: Examples of possible UPT user performance targets**

No	Requirement	Priority	Function
34	Making a UPT call 50 % of a representative sample of the target population of UPT users should be able to successfully make a UPT call to another UPT user at their first attempt on being presented with a UPT compatible terminal, a valid UPT access device, and the UPT target user's UPT address. 90 % of the same sample should be able to undertake the same task at their third attempt, using only the information presented on or via the terminal.	HIGH	
35	Receiving a UPT Call a 50 % of a representative sample of the target population of UPT users should be able to successfully receive a UPT call from another UPT user at their first attempt on being presented with a UPT compatible terminal, a valid UPT access device, and the UPT target user's UPT address. 90 % of the same sample should be able to undertake the same task at their third attempt, using only the information presented on or via the terminal.	HIGH	
36	Editing a UPT user's service profile, e.g. changing a PIN/password, changing a personal mobility state, etc.	HIGH	
37	Accessing and controlling a UPT Supplementary service(s).	HIGH	

**6.1.4.2 User preferences**

Usability also includes a user preference component. Therefore, to maximise the probable success of the service, the majority of a representative sample of UPT users should after a representative trial period (e.g. one week or month) give a preference rating of the UPT service as preferable to competitive services. Some examples are given in table 9.

**Table 9: Examples of possible UPT user preference comparisons**

No	Requirement	Priority	Function
38	better than the use of the ordinary service accessed when roaming by interpersonal negotiation, e.g. asking a business colleague if you can use her phone.	HIGH	
39	better than the use when roaming of calling card services on ordinary phones.	HIGH	
40	better than the use of cash/prepaid-cards/credit-cards/reverse-charge-calls when using ordinary public phones.	HIGH	
41	better than the use of hotel phones.	HIGH	
42	better than the use of ordinary phones supported by Terminal/PABX/PTN services with respect to transferring calls for other parties, etc.	MED	
43	better than the use of ordinary phones by giving users control over incoming calls.	MED	

**6.1.4.3 User perceptions**

Irrespective of the reality, it is very easy for users to get a misconception of a service, its quality, integrity, and reliability, therefore, it is essential that the service components (terminal, access device, access provider, connectivity provider and service provider) actively promote and support a positive user centred image. The user perception requirements are listed in table 10.

**Table 10: Requirements for positive user perceptions of the UPT service**

No	Requirement	Priority	Function
44	confident that the service, access, connectivity provider and terminal protects the integrity of the service profile/registration data	HIGH	
45	confident the service provider does not misuse information about service usage, e.g. location of users, usage patterns, etc.	HIGH	
46	confident of system security: e.g.: - clear indication of all UPT calls elements on the bills to enable easy call tracking; - no surprise changes to UPT service quality/level/charges/etc.; - no possibility of fraudulent duplication of access devices; - minimal chance of losing UPT access devices.	HIGH	
47	confident of the use of the most efficient (and perhaps least-cost) routing, especially for incoming calls which incur a UPT on-cost, e.g. when roaming. Unless the user specifically requests a higher cost route e.g. for service/transmission quality reasons.	MED	
48	confident of no additional procedures/charges for ordinary users/subscribers calling UPT users identity.	HIGH	

**6.2 Service control**

The service control requirements extrapolated from the interaction scenarios (see subclause 5.3) are described for each of the defined users within the UPT service. No assumption is made on the likely time frame for the introduction of the UPT service, nor between any form of implementation.

**6.2.1 UPT users**

UPT user selection of features and services is a significant aspect of the UPT service. In particular UPT users are concerned with the creation and changes to a personalized service profile, real time control of point of access, real time control of outgoing and incoming calls and the monitoring of call charges.

**6.2.1.1 UPT service profile**

UPT user requirements for UPT service profile control are listed in table 11.

**Table 11: UPT service profile requirements**

No	Requirement	Priority	Function
49	should be able to interrogate the status of the UPT service profile for all aspects which effect the quality of his service, e.g.: <ul style="list-style-type: none"> <li>- which teleservices, supplementary services are available/active;</li> <li>- which UPT identity terminates where;</li> <li>- which require authentication on answer, whether there are lists of UPT/ordinary users with restricted/unrestricted access, etc., from any UPT service access point.</li> </ul>	HIGH	
50	should be able to create/edit those aspects of his service profile which affect his service use, that are available for creation/editing within the UPT subscribers and subscriptions agreed parameters, as a minimum from terminals within his UPT home access area: <ul style="list-style-type: none"> <li>changes which require subscriber clearance should be automatically prompted to subscriber, for validation, or a call to the subscriber offered to enable negotiation.</li> </ul>	HIGH	
51	should be able to integrate/control UPT services with respect to UPT roles/identities, irrespective of the role/identity with which the enquiry is initiated.	HIGH	
52	may be able to restrict/control information given to service provider/access provider/connectivity provider with respect to existing location/address of access terminal, for legitimate privacy/security reasons: <ul style="list-style-type: none"> <li>conversely specific end-users may be able to override restriction of location/address information from other users for emergency/security reasons.</li> </ul>	HIGH	
53	should be able to simply differentiate roles for outgoing/incoming calls. The segregation of user roles and UPT access devices may be as useful as the co-ordination of roles and access devices: <ul style="list-style-type: none"> <li>- registration maybe for single or multiple roles.</li> <li>- authentication of the access device by the service maybe for single or multiple roles.</li> <li>- authentication by the UPT user may be for single or multiple roles.</li> </ul>	HIGH	
54	should be informed if the call being made by the ordinary user has negative charging implications because he/she is calling a UPT user, the ordinary user	HIGH	
55	appropriate feedback should be given to an ordinary user calling a UPT user registered for incoming calls with secure answering.	HIGH	
56	the prompting given to the UPT user to authenticate to the UPT service in order to receive the call should state who the call is for, to prevent confusion if more than one UPT user is registered and to prevent further delays for the ordinary user.	HIGH	
57	to gain access to the data in the UPT service profile the UPT user should go through security procedures.	HIGH	
58	the service profile interrogation procedure should be easy to perform, whilst still providing the necessary security.	HIGH	
59	the UPT user should be notified of changes to the personal mobility state, particularly if it is induced by other entities (e.g. service provider, ordinary subscriber).-	HIGH	
60	when prompting the UPT user to enter user procedure choices or values for parameters for these procedures, the personal mobility state should be reflected so that only the legal values are displayed. This will prevent the UPT user from making errors and help the UPT user to make corrections.	HIGH	
61	the UPT user should be allowed to short-cut the user procedures, so that feedback is only given upon completion of the appropriate whole task (particularly relevant if UPT access device is used).	HIGH	

## 6.2.1.2 Real time control

The UPT service should ensure the user procedures necessary for real time control are as simple and direct as possible for the majority of users. Additional requirements are listed in table 12.

Table 12: Requirements for real time control

No	Requirement	Priority	Function
62	basic access to the UPT service should be automated, e.g. as simple as lifting the handset, switching on the terminal, selecting a menu item. In normal use, UPT users should not be expected to manually request access to the UPT service, e.g. key in a UPT access number/code.	HIGH	
63	user identification should be automated e.g. sent automatically on lifting the handset, switching on the terminal, etc. Only in abnormal situations should the user have to key in his UPT identification.	HIGH	
64	authentication of the UPT access device should be automated and in the normal situation unknown to the user.	HIGH	
65	UPT user authentication should be as simple as a PIN or password, with the usual protections for keying errors and fraudulent use.	HIGH	
66	registration/authentication should not be necessary for each communication when the user is accessing the service at his regular terminal/s: <ul style="list-style-type: none"> <li>- when an access device has been left for a period within a terminal without communication activity it may be appropriate for the user to re-authenticate (similar to a screen saver with password);</li> <li>- within limited parameters the user may wish to set his own authentication requirements as a part of his service profile. For example, within the office and at home - no authentication required, when roaming out of the home network - full authentication.</li> </ul>	MED	
67	should be supported by effective error correction techniques, e.g.: <ul style="list-style-type: none"> <li>- prompts/warnings/messages in preferred language;</li> <li>- with respect to services that are in error e.g. call forwarding has now been requested to chain/circle (i.e. A forwards to B, B forwards to C, C forwards to A). warning should be provided even when roaming;</li> <li>- able to request automatic retry/re-routeing/call completion options of failed calls;</li> <li>- error status reports should also give prompts to available user options where possible.</li> </ul>	HIGH	
68	should be prompted for critical events within UPT telecommunications since last registration, e.g. message from X in voice mail, Y has called N times, but no message: <p>all events for all roles/identities should be included within any registration irrespective of the role/identity used. For example, when a user registers to call home in the evening using her personal UPT identity, she should also be prompted of any new events relevant to her business identity. Further enquiry to the business events should not automatically require further registration/authentication. Critical events can also include changes to service profile/ service capability/ subscription /service charges/ etc.</p>	HIGH	
69	should enable multiple user registration at a single terminal, where each user may register with more than one UPT role/identity: <ul style="list-style-type: none"> <li>- to receive incoming calls a UPT user may then have to confirm his registration/authentication, depending on the service/call type, e.g. by inserting his access device into the terminal.</li> </ul>	HIGH	
70	should be able to ask for authentication of service providers and other UPT users to protect against service abuse.	HIGH	
71	should be able to get direct help for completing UPT service requests/calls, and for supporting the access and control of UPT services. The help should be available at all times from any geographical location served, in the preferred language.	HIGH	



6.2.1.3 Charge monitoring

The UPT user should be able to monitor service charges, see table 13.

Table 13: Requirements for UPT charge monitoring

72	where changes to service profile invoke changes to applicable charge rates the user should be aware of the change. In principle the user should have clear knowledge of the cost rates applying to UPT services, before he makes use of those services. This principle should result in users being prompted with respect to UPT service on-costs at the time of receipt of an incoming call, especially when roaming.	MED	
73	may interrogate current/history statistics on their own UPT registrations/service usage, at a minimum within the home service area.	MED	
74	<p>should be supported with facilities to help the users maintain cost controls on their communications. In general, a user should be able to predict the costs incurred on their bills, and for individual call charges:</p> <ul style="list-style-type: none"> <li>- should be prompted and able to interrogate/control UPT service charges before during and after a service is invoked, at the users request. Especially before significant UPT roaming on-costs and accepted, before pre-set budget limits are exceeded, before cost changes due to changes in quality/priority or due to time of day/month;</li> <li>- should be able to interrogate and verify statistics with respect to call charges, e.g. service totals to date, current charge rates, these should identify and include any elements necessary for accommodation of access providers, connectivity providers and other service providers. The enquiry should enable access to all charge statistics related to each of the UPT users roles/identities without the need to register, but with additional security clearance if necessary;</li> <li>- may have the ability to negotiate/share part payments for additional charges, as a minimum UPT/ordinary users should have the right to cancel calls that incur additional charges. It could be useful to have costed options at these points, e.g. £X for person to person call, £X-Y for user to user signalling/voice mail/e-mail, etc.;</li> <li>- service profile changes that require subscriber/service provider agreement because of cost impacts require rapid validation. They could be able to be sent automatically for approval/rejection, via the UPT service, the answer could also be confirmed back to the user at the next registration. The minimum facility would be a call offered to the UPT user to enable negotiation.</li> </ul>	HIGH	

6.2.1.4 Supplementary services

The UPT user should be able to access and control UPT supplementary services, see table 14.

**Table 14: Requirements for supplementary service control**

No	Requirement	Priority	Function
75	<p>should be supported by integrated ancillary/supplementary services that reflect the users communications tasks. For example, on call set-up failure, the target user may have a voice mail box set up, but as a default the service provider could offer voice mail, user to user signalling, call back when free/registered, etc.:</p> <ul style="list-style-type: none"> <li>- should be able to predict the accessibility of other users, prior to call set-up, particularly when roaming, particularly with a registered list of preferred/acceptable callers (white list) their current status could be kept up to date by the service provider.</li> <li>- should be able to handle supplementary services, for all services/roles/UPT identities, in an integrated way. For example, call forwarding - personal videotelephony call to home videotelephony, business fax calls to temporary office fax, business e-mail to temporary data port, etc.</li> </ul>	HIGH	

6.2.1.5 UPT access device

To maximise its usability, the UPT user requires that the UPT access device should accommodate the requirements listed in table 15.

**Table 15: Requirements for the UPT access device**

No	Requirement	Priority	Function
76	portable, lightweight, small, handle-able (not too small), robust, pocket-able,	HIGH	
77	easily identifiable both generally as a UPT access device and personally as belonging to particular UPT user (also by the visually or dexterity impaired),	HIGH	
78	easy to locate, when lost, and returnable, if found,	HIGH	
79	simple to connect (to UPT terminal, (including by visually and dexterity impaired users),	HIGH	
80	depending on the terminal it should not be easy to leave in the terminal accidentally. For example, on public UPT terminals, it may be useful to ensure users remove the access device in order to complete/progress their goal task, i.e. remove card before call is connected.	HIGH	
81	easily identifiable both generally as a UPT access device and personally as belonging to particular UPT user who may be visually or dexterity impaired,	HIGH	

**6.2.2 UPT subscribers**

Some requirements for UPT subscribers are listed in table 16.

**Table 16: Some requirements for UPT subscribers**

No	Requirement	Priority	Function
82	review services, functions, mobility, available to UPT users associated with subscription.	HIGH	
83	add or delete (block) selected functions available to UPT users associated with subscription.	HIGH	
84	monitor UPT users associated with subscription, with respect to services and functions.	MED	
85	modify service profile for subscription users.	HIGH	

Additional requirements are for further study.

**6.2.3 UPT service providers**

Some requirements for UPT service providers are listed in table 17.

**Table 17: Some requirements for UPT service providers**

No	Requirement	Priority	Function
86	monitor services, functions, contracted to UPT subscribers.	HIGH	
87	block selected services, functions contracted to subscribers.	HIGH	
88	modify service profile for UPT subscribers	MED	

Additional requirements are for further study.

**6.2.4 Ordinary users/subscribers**

Some requirements for ordinary users and subscribers with respect to the UPT service are listed in table 18.

**Table 18: Some requirements for ordinary users and subscribers**

No	Requirement	Priority	Function
89	have unrestricted access to UPT users, subject only to UPT users registered state.	HIGH	
90	receive feedback about calls unconnected due to UPT users registered state	HIGH	
91	have prior information about oncosts associated with connection to UPT users.	HIGH	
92	have information about UPT users registered at ordinary subscribers access points.	HIGH	

Additional requirements are for further study.

### 6.2.5 UPT access providers

Some requirements for UPT access providers are listed in table 19.

**Table 19: Some requirements for UPT access providers**

No	Requirement	Priority	Function
93	unrestricted use of own terminal.	HIGH	
94	ability to interrogate UPT service for UPT users registered at their access points.	HIGH	
95	ability to block registered UPT users from use of their access points.	HIGH	

Additional requirements are for further study.

### 6.2.6 UPT connectivity providers

Some requirements for UPT connectivity providers are listed in table 20.

**Table 20: Some requirements for UPT connectivity providers**

No	Requirement	Priority	Function
96	transmit UPT registered calls without corruption or significant delay.	MED	
97	be able to monitor UPT registered calls with respect to UPT subscriber and UPT service provider and service profile.	MED	

Additional requirements are for further study.

## 7 Conclusions and recommendations

### 7.1 Discussion

During the period of evolution of the UPT service, many aspects have been developed where decisions may have been taken without full consideration of users' needs and requirements. The earlier work of Human Factors Technical Committee more specifically Sub-Technical Committee HF1, tried to analyse and identify problem areas likely to be critical to the users. Many details were at that time unresolved, although the basic service has remained as conceived, as far as it is apparently documented in ETSI. It can be noted that the references listed do not include any specific to UPT phase 1. However, the rapid growth and significance for the user of mobile telephony generally (in particular) has stressed the importance of the UPT service being able to be fully competitive. This has led to increased emphasis on usability, both for general access and use of the UPT service, and for its added value features being the key to its success.

This ETR has reviewed key features of the UPT service, identified the users and their interaction with the various elements and listed most users requirements arising from these interactions. These requirements have to be measured against the functionality defined for the UPT service in an attempt to assess how far they are met, and the significance of any omissions. Because only general features of functionality are defined so far for the UPT service, no attempt has been made to perform such an analysis in this report, but it is suggested that this work should be undertaken by interested parties within TC-NA, with the assistance of TC-HF, provided that resources are available after the publication of this document.

When attempting to assess the priority of each user requirement it became apparent that almost all those identified were significant in some way to the user and therefore had to be classified as of high priority. A certain number of the requirements may be met in different ways and this allows scope for individual service providers to enhance their own Man-Machine Interface (MMI). One such instance, is the need for a UPT user or subscriber to be able to review and change items in the service profile on-line, which clearly requires interactive dialogue with the service provider, and the implication that the user interface may need to support a comprehensive visual display system, as voice alone may not be enough. Apart from this special case, there is a need to define other UPT special announcements and feedback messages, identified in many of these requirements, as part of the MMI.

## 7.2 Conclusions

Based on a review and analysis of the documentation available from TC-NA and other sources [7], this ETR contains an attempt to draw up users' requirements based both on these UPT specific functions and other non-specific telecommunications functions. It has not been possible to estimate to what extent these requirements are being met by the functionality defined so far. It should also be emphasised that some functionality may not be fully defined until implemented by different service providers.

It may be concluded that the user requirements provided here are to be considered as guidelines and need to be compared with UPT functionality during implementation.

## 7.3 Recommendations

Two main recommendations may be given:

- that the user requirements are considered as guidelines for future implementation and design of UPT services and the MMI to support them;
- that work groups within STC-NA7 carry out a functionality analysis for their different areas, e.g. security, services and access (device and terminal), etc.

## Annex A: UPT user's user control procedures

### A.1 Introduction

This annex specifies some of the user control procedures that may need to be accommodated within a UPT user's user interface according to a review of ETR 055-1/10 [2]. The specification takes the form of a state transition description of the UPT user's user interface, and covers the needs for basic registration and the handling of outgoing and incoming calls. Additional requirements relating to the UPT user's user interface in relation to interactions with the service provider and other service users are identified in the scenarios described in clause 5.

The UPT user's user interface is described in the State Transition Diagram (STD) in figure A.1. The user control procedures necessary to complete the transitions are described in more detail SDL (see CCITT Recommendation Z.100 [1]). These diagrams are found in clause A.5. To make the diagrams easier to follow, a short description of each state, each control action and each indication is provided.

The STD and the SDL diagrams were developed in parallel, allowing a check to occur in the definition of the user control procedures. The background for this type of approach to the definition of user control procedures has been documented in ETR 170 [5]. The approach allows a users centred description of the user control procedures which is independent of any implementation and which enables terminal manufacturers and service providers opportunities for product differentiation whilst giving the user some degree of consistency.

The SDL descriptions of the UPT user's user control procedures incorporate requirements for feedback and prompting necessary to the UPT user when communicating with the UPT service. The descriptions also include some requirements with respect to error handling and short-cuts. Requirements for exit possibilities and system response times are for further study.

The STD and the SDL are of the UPT user interface only. This is a first step in specifying the user interfaces outlined in subclause 4.2.2. Similar activities may be undertaken for the other entities that have been identified. Such additional activity will be to ensure consistency and to identify problems within the service from all the various users' point of view.

In reviewing the reference documents ETR 55-1/10 [2], 19 states were identified, as well as the signals that are needed for transition between the states. These input and output signals reflect the concept that for every user input (control action), there must be a corresponding output (system indication). In human factors terms these are called "Control" and "Indications", and the corresponding signals are prefixed with C and I as appropriate. Ideally, only the signals that reflect the state changes effected from the network carry the prefix N.

State names have their labels written in upper case text. The signals have their first letters and any abbreviations in upper case text, and any subsequent letters in lower case text. The words in both state names and signals are separated by underscores. The state names reflect the procedures that UPT users might encounter. At various points in the dialogue, information is requested from the user. The information associated with the various states carry the prefix associated with the states for which the information is required. Information required for "Procedures", carry the prefix P, and for "Mobility" information, carry the prefix M. These additional information signals can be associated with the prefixes identified above, that is either as a control or indication. In the latter case an indication for a procedure code in human factors terms may be considered as a prompt for user input, irrespective of what form it takes.

Other prefixes that are used in the various states are for directional information (IC for incoming, and OG for outgoing).

The following table lists the names of the states, input and output signals as far as the work allows.

Table A.1: List of States, Input Signals and Output Signals

States	Input signals	Output signals
0 IDLE	C_Access_Code	I_Access_Fail
1 INPUT 2 INPUT2	C_Auth	I_Access_OK
3 AUTHENTICATE	C_Call_Info	I_Alerting
4 P_CODE	C_Connect	I_Auth_Fail
5 DISCONNECT	C_Disconnect	I_Auth_Fail2
6 P_INFO	C_Identity	I_Auth_OK
7 MODIFICATION	C_M_Info	I_Auth_RQ
8 M_INFO_VERIFY	C_No	I_Call_Info_Fail
9 FOLLOW_ON	C_P_Code	I_Call_Info_OK
10 OG_ALERTING	C_Reject	I_Disconnected
11 OG_CONNECTED	C_Start	I_Identity_Fail
12 IC_ALERTING	C_Yes	I_Identity_OK
13 IC_CONNECTED	N_Alerting	I_Identity_RQ
14 IC_AUTHENTICATE	N_Connected	I_Info
15 OG_AWAIT_REANSWER	N_Disconnect	I_M_Info
16 OG_REANSWER_ALERTING	N_M_Info	I_M_Info_Verify_RQ
17 IC_AWAIT_REANSWER	N_Release	I_OG_Alerting
18 IC_REANSWER_ALERTING.	T_Identity	I_P_Activated
		I_P_Code_Fail
		I_P_Code_Fail2
		I_P_Code_OK
		I_P_Code_RQ
		I_P_Info_RQ
		I_P_Not_Activated
		I_Release
		I_Start

Annotations to the SDL diagram, in the form of notes, are meant to identify where items are for further study.

## A.2 UPT user's user interface states

The UPT user's user interface states for basic registration an call handling identified in table A.1 are described below:

- **0: IDLE:** The user interface is in its resting state, waiting for input from the UPT user or the UPT service.
- **1: INPUT:** The UPT user interface is waiting for the UPT user to enter the UPT access code.
- **2: INPUT2:** The UPT user has entered the correct UPT access code. The UPT user interface is waiting for identification (personal user identity).
- **3: AUTHENTICATE:** The UPT user has been correctly identified. The UPT user interface is waiting for authentication information.
- **4: P\_CODE:** The UPT user has successfully completed "Access", "Identification" and "Authentication". The UPT user interface is waiting for choice of user procedure, which may be personal mobility, call handling or service profile management procedures.
- **5: DISCONNECT:** The UPT user's session has been terminated, either by the user at the other end or by the UPT service. The UPT user interface is expecting the UPT user to terminate at his/her end.
- **6: P\_INFO:** The UPT user has entered a legal choice of user procedure, and the UPT user interface is waiting for additional information relating to the specific procedure.

- **7: MODIFICATION:** The UPT user has chosen a service profile management procedure and entered a legal parameter which he/she wishes to modify. The UPT user interface is waiting for the UPT user to enter the new value of this parameter.
- **8: M\_INFO\_VERIFY:** The UPT user has entered information relating to a user mobility procedure. The UPT user interface has prompted the user to verify that the registered information is correct. The UPT user interface is waiting for confirmation before invoking the function.
- **9: FOLLOW\_ON:** For further study.
- **10: OG\_ALERTING:** The UPT user has entered UPT call handling information (called party's number) correctly, and there is alerting on the called party's side. The UPT user interface is waiting for the called party to answer.
- **11: OG\_CONNECTED:** The UPT user has made an outgoing call and is connected to the called party.
- **12: IC\_ALERTING:** The UPT user is being alerted of an incoming call. The UPT user interface is waiting for the UPT user to accept or reject the call.
- **13: IC\_CONNECTED:** The UPT user has received an incoming call, and is connected to the calling party.
- **14: IC\_AUTHENTICATE:** The UPT user's service profile is set up to use secure answering. The UPT user interface is waiting for the UPT user to go through the authentication procedure in order to receive the incoming call.
- **15: OG\_AWAIT\_REANSWER:** The UPT user has made an outgoing call and has been connected to the called party. The called party has terminated the call. In some systems the call may be reanswerable by the other party. There is alerting at the called party's side again, and the UPT user interface is waiting for the called party to reanswer, or for the UPT user to terminate.
- **16: OG\_REANSWER\_ALERTING:** The UPT user has made an outgoing call and has been connected to the called party. The UPT user has terminated the call. In some cases this may not be allowed (emergency numbers etc.), and the UPT user is again alerted that a call is waiting.
- **17: IC\_AWAIT\_REANSWER:** The UPT user has received an incoming call and has been connected to the calling party. The calling party has terminated the call. In some systems the call may be reanswerable by the calling party. There is alerting at the calling party's side again, and the UPT user interface is waiting for the calling party to reanswer, or for the UPT user to terminate.
- **18: IC\_REANSWER\_ALERTING:** The UPT user has received an incoming call and has been connected to the calling party. The UPT user has terminated the call. In some cases this may not be allowed and the UPT user is again alerted that a call is waiting.



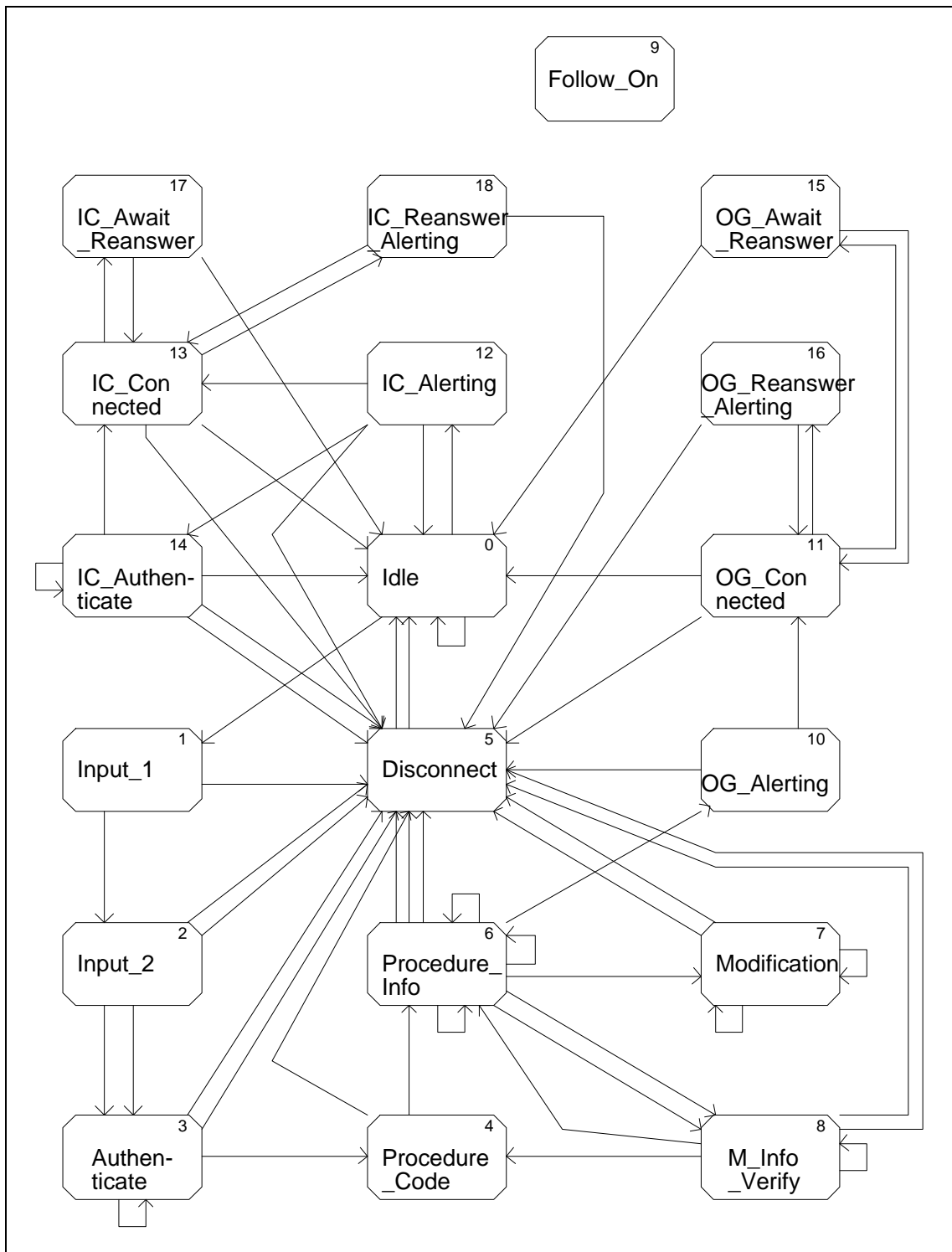


Figure A.1: UPT user's user interface STD for registration and call handling

### A.3 UPT user's user control procedures input signals

The input signals with prefix "C\_" go from the UPT user to the UPT user interface. The signals labelled "N\_" go from the UPT service to the UPT user interface. The signals labelled "T\_" go from the terminal to the UPT user interface.

- **C\_Start:** This is the UPT user's "wake-up" signal to the UPT user interface. In a normal PSTN telephone this would typically be to lift the handset.
- **N\_Alerting:** This is an incoming call, and the UPT service is signalling this to the User Interface, i.e. this signal is coming from the network side.

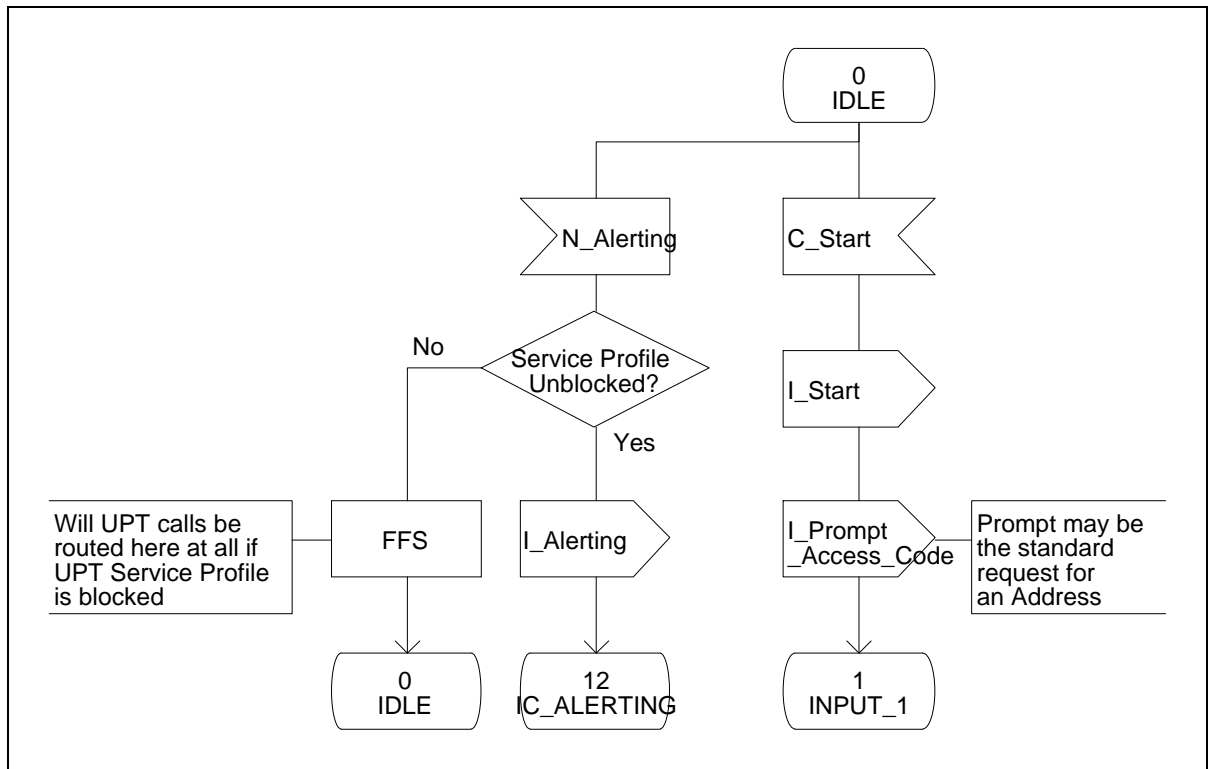
- **C\_Access\_Code:** This signal holds the access code to the UPT service, as entered by the UPT user.
- **C\_Identity:** This signal holds the UPT user's identity, as entered by the UPT user.
- **T\_Identity:** This signal holds the UPT user's identity, and has been obtained automatically by the UPT user interface.
- **C\_Auth:** The UPT user uses this signal to authenticate himself to the UPT service.
- **C\_P\_Code:** This signal holds the code for the chosen user procedure, as entered by the UPT user.
- **C\_Disconnect:** The UPT user signals the he/she wishes to terminate the session (in a PSTN telephone this would be replacing the handset).
- **N\_Disconnect:** The UPT service uses this signal to terminate a session.
- **C\_M\_Info:** This signal holds information associated with the chosen user mobility procedure, as entered by the UPT user.
- **C\_Call\_Info:** This signal holds information associated with the call handling procedure, as entered by the UPT user.
- **N\_M\_Info:** This signal holds information associated with the user mobility procedure, obtained automatically by the UPT user interface.
- **C\_Yes:** The UPT user uses this signal to confirm something to the UPT user interface, e.g. confirming that the entered UPT mobility information is correct.
- **C\_No:** The UPT user uses this signal to reject something which the UPT user interface has asked for confirmation on.
- **N\_Connected:** The UPT service uses this signal to indicate to the UPT user interface that a call has been connected.
- **N\_Release:** The UPT service uses this signal to indicate to the UPT user interface that a session has been terminated (e.g. in PSTN an audio signal indicating that the call has been disconnected).
- **C\_Connect:** The UPT user uses this signal to indicate to the UPT user interface that he/she wishes to accept an incoming call (e.g. in PSTN telephony: lifting the handset).
- **C\_Reject:** The UPT user uses this signal to indicate to the UPT user interface that he/she does not want to accept an incoming call.
- **C\_Mgt\_Info:** The UPT user uses this signal to indicate which parameter in the service profile that he/she wishes to modify.
- **C\_Mgt\_Mod:** The UPT user uses this signal when performing service profile modification to enter the new value of a parameter in the service profile.

#### A.4 UPT user's user control procedures output signals

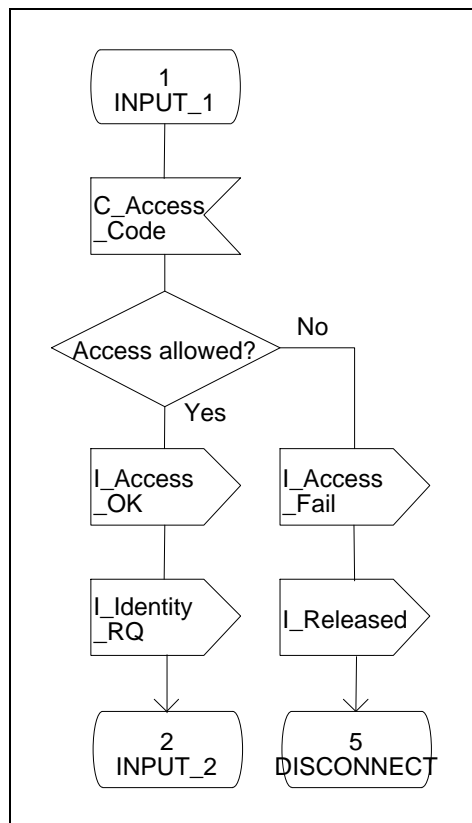
- **I\_Start:** Feedback that the UPT user interface has indeed been "woken up", and is ready to take input from the user (e.g. dial tone in PSTN telephones).
- **I\_Alerting:** Alerting signal to indicate that an incoming call is waiting to be accepted.
- **I\_Access\_OK:** Feedback that the UPT user has entered a legal UPT service access code.
- **I\_Identity\_RQ:** Request to UPT user to enter personal user identity.
- **I\_Access\_Fail:** Feedback that the UPT user has entered an illegal UPT service access code.
- **I\_Identity\_OK:** Feedback that the UPT user has entered a legal personal user identity.
- **I\_Auth\_RQ:** Request to UPT user to enter authentication information.
- **I\_Identity\_Fail:** Feedback that the UPT user has entered an illegal personal user identity.
- **I\_Release:** Indication that the UPT service has terminated the session and that the UPT user interface is expecting the UPT user to terminate.
- **I\_Auth\_OK:** Feedback that the UPT user has entered correct authentication information.
- **I\_P\_Code\_RQ:** Request to UPT user to chose user procedure by entering the code for the chosen user procedure.
- **I\_Auth\_Fail:** Feedback that the UPT user has entered illegal authentication information, but that further attempts are allowed.
- **I\_Auth\_Fail2:** Feedback that the UPT user has entered illegal authentication information and is not allowed to try again.
- **I\_P\_Code\_OK:** Feedback that the UPT user has entered a legal user procedure code.
- **I\_P\_Info\_RQ:** Request to UPT user to enter information associated with the chosen user procedure.
- **I\_P\_Code\_Fail:** Feedback that the UPT user has entered an illegal user procedure code, but that he/she is allowed to try again.
- **I\_P\_Code\_Fail2:** Feedback that the UPT user has entered an illegal user procedure code and is not allowed to try again.
- **I\_Disconnected:** Feedback that the session is completely terminated and that the UPT user interface has returned to IDLE state.
- **I\_M\_Info:** Feedback on information that the UPT user has entered in association with a personal mobility procedure (e.g. by echoing the entered information).
- **I\_M\_Info\_Verify\_RQ:** Request to UPT user to confirm that the information associated with a personal mobility procedure is indeed correct so that the function can be invoked.
- **I\_Call\_Info\_OK:** Feedback that the UPT user has entered legal information associated with a call handling procedure (e.g. a number for an outgoing call).
- **I\_Call\_Info\_Fail:** Feedback that the UPT user has entered illegal information associated with a call handling procedure (e.g. an illegal number).
- **I\_Proc\_Activated:** Feedback that a specific user procedure has been activated.

- **I\_Proc\_Not\_Activated:** Feedback that a specific user procedure has not been activated.
- **I\_OG\_Alerting:** Feedback to the UPT user that the called party is being alerted of an incoming call.
- **I\_Profile\_Blocked:** The UPT user has performed successful authentication to the UPT service, but it is by this signal is informed that the service profile is blocked for some reason (e.g. exceeded the limit on unsuccessful authentications)
- **I\_Mgt\_Mod\_RQ:** Request to UPT user to enter the value of a parameter in the service profile during Service Profile Modification.
- **I\_Mgt\_Status:** Feedback to the UPT user on the status of a requested parameter in the service profile during service profile modification.
- **I\_M\_Info\_Fail:** Feedback that the UPT user has entered an illegal value for an input parameter to the chosen personal mobility procedure, but that he/she is allowed to try again.
- **I\_M\_Info\_Fail2:** Feedback that the UPT user has entered an illegal value for an input parameter to the chosen personal mobility procedure and is not allowed to try again.
- **I\_Call\_Info\_Fail:** Feedback that the UPT user has entered an illegal value for an input parameter to the chosen call handling procedure (e.g. called number is not in list of allowed numbers in the service profile), but is allowed to try again.
- **I\_Call\_Info\_Fail2:** Feedback that the UPT user has entered an illegal value for an input parameter to the chosen call handling procedure and is not allowed to try again.
- **I\_Mgt\_Mod\_OK:** Feedback that the UPT user has entered a valid new value for a parameter in the service profile during service profile modification.
- **I\_Mgt\_Mod\_Fail:** Feedback that the UPT user has entered an illegal new value for a parameter in the service profile during service profile modification, but is allowed to try again.
- **I\_Mgt\_Mod\_Fail2:** Feedback that the UPT user has entered an illegal new value for a parameter in the service profile during service profile modification and is not allowed to try again.

**A.5 SDL diagrams for the UPT user's user control procedures for registration and call handling**



**Figure A.2: SDL procedures from state 0 - IDLE**



**Figure A.3: SDL procedures from state 1 - INPUT\_1**

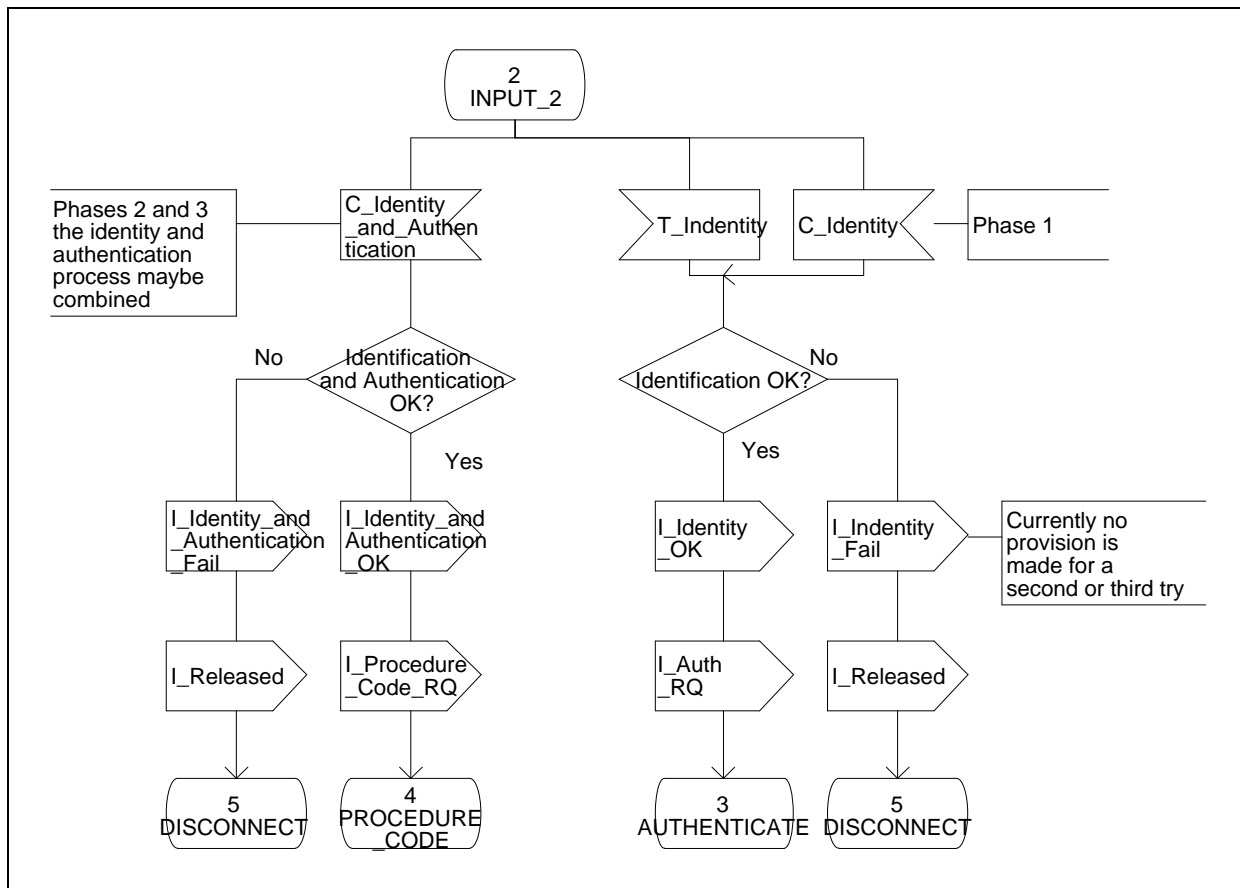


Figure A.4: SDL procedures from state 2 - INPUT\_2

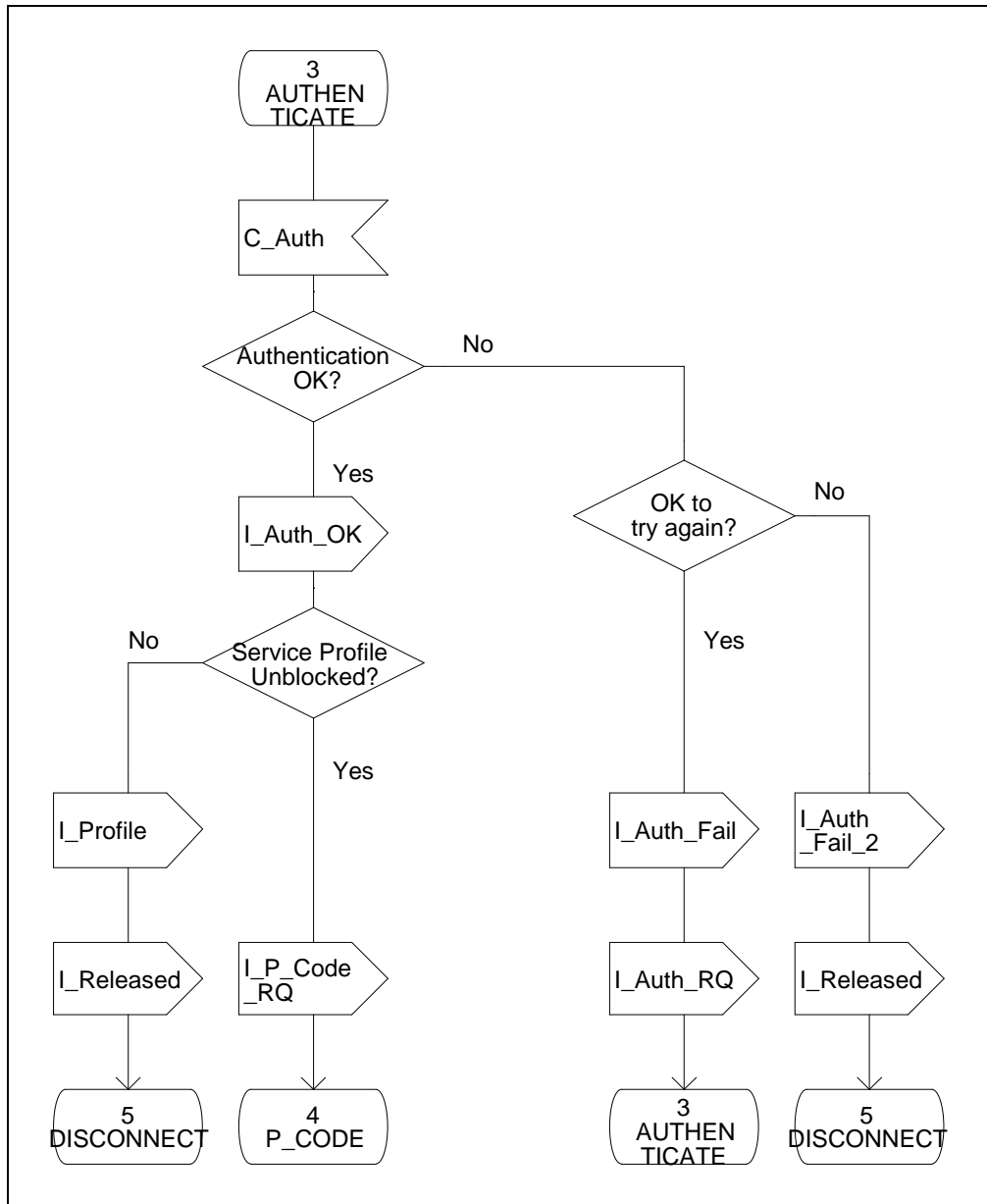


Figure A.5: SDL procedures from state 3 - AUTHENTICATE

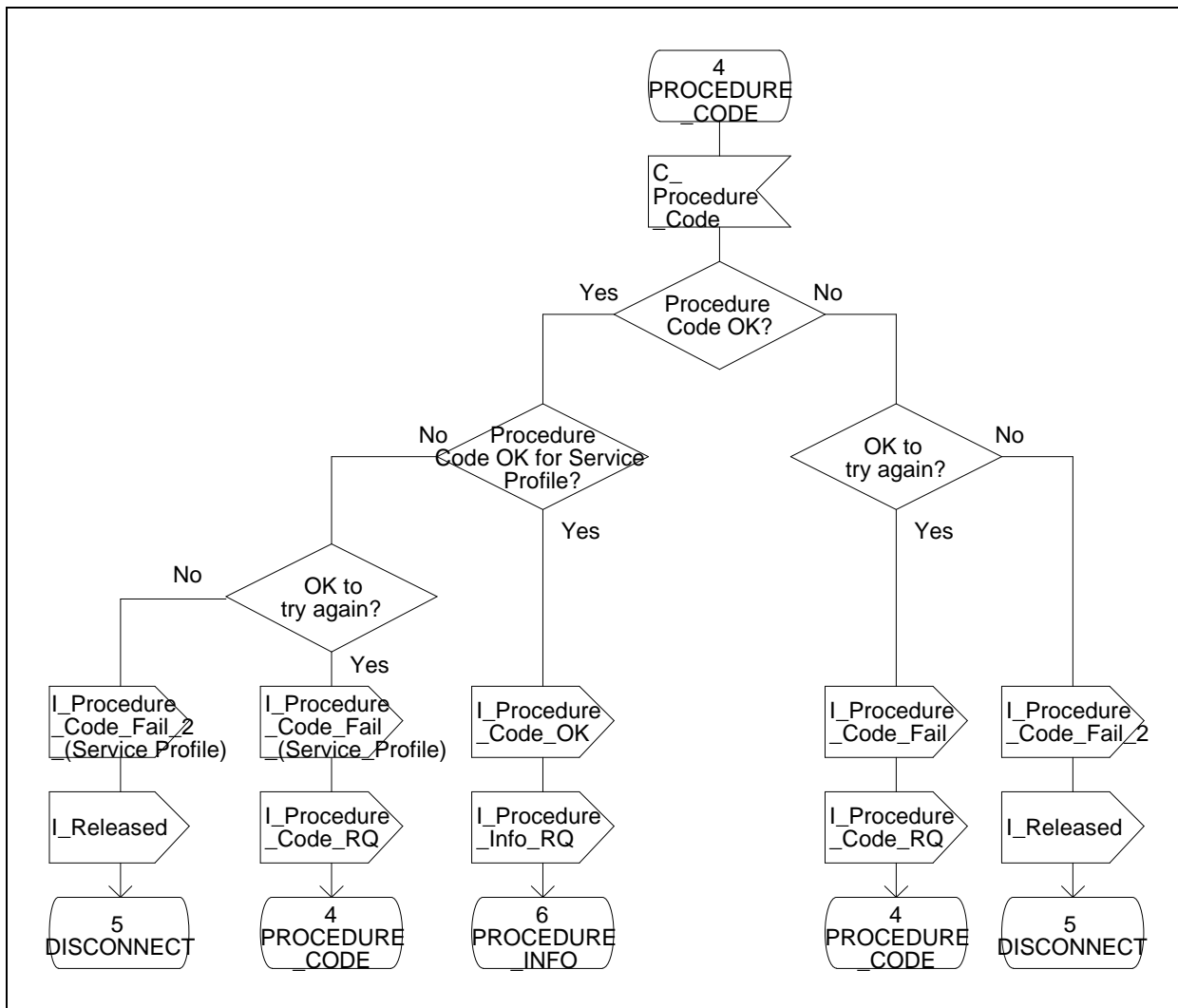


Figure A.6: SDL procedures from state 4 - PROCEDURE\_CODE

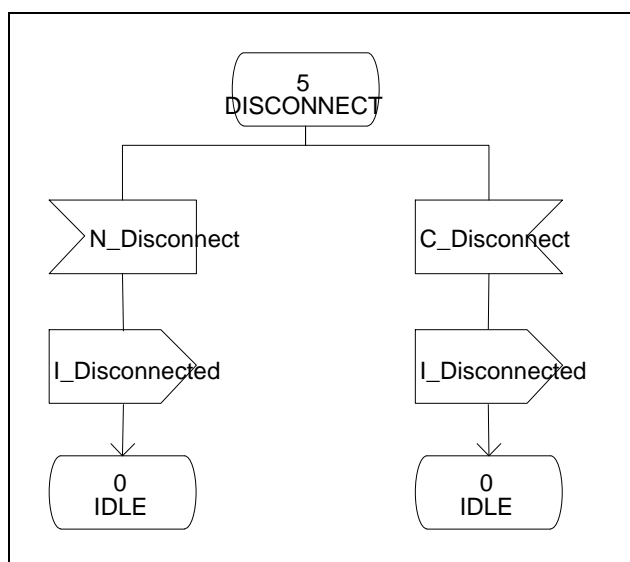


Figure A.7: SDL procedures from state 5 - DISCONNECT



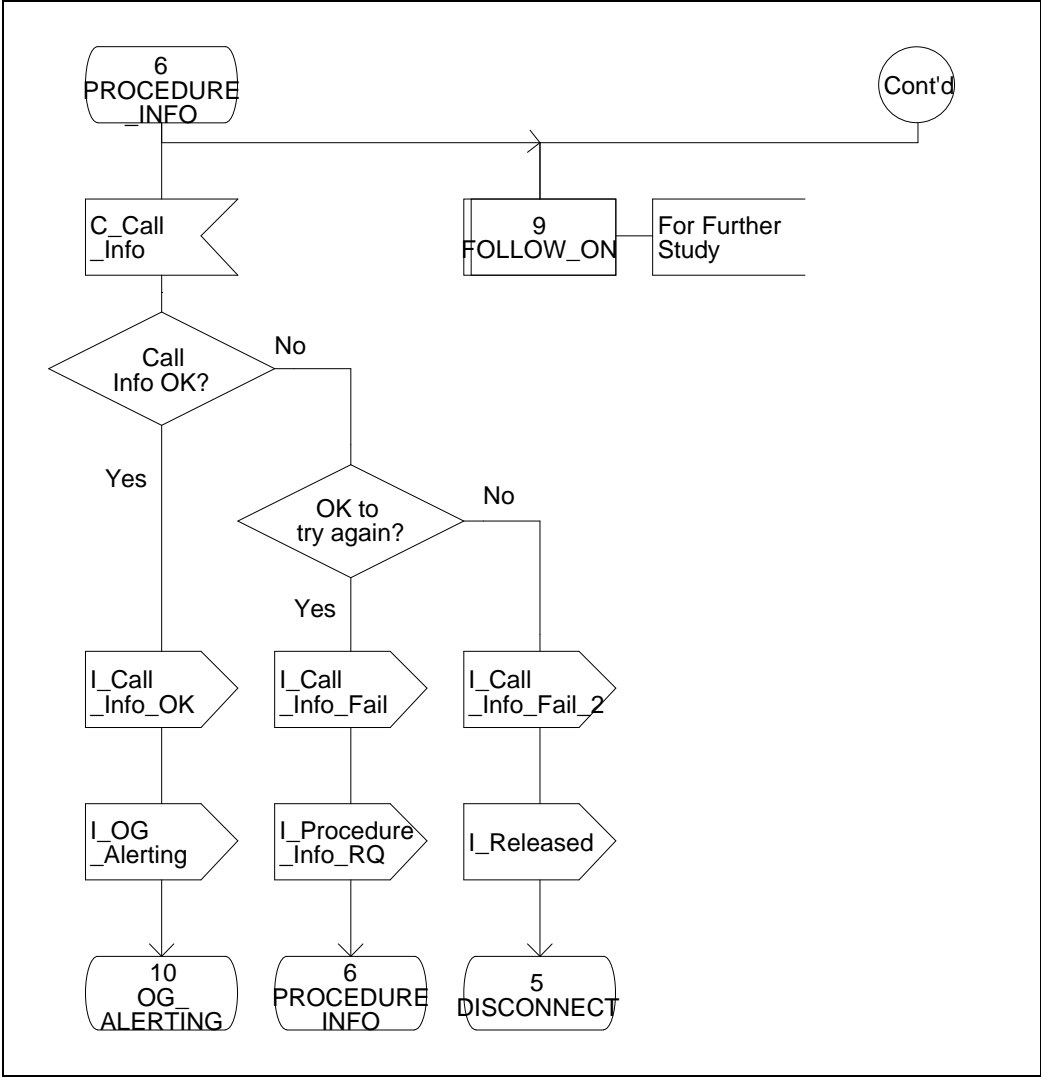


Figure A.8: SDL procedures from state 6 - PROCEDURE\_INFO

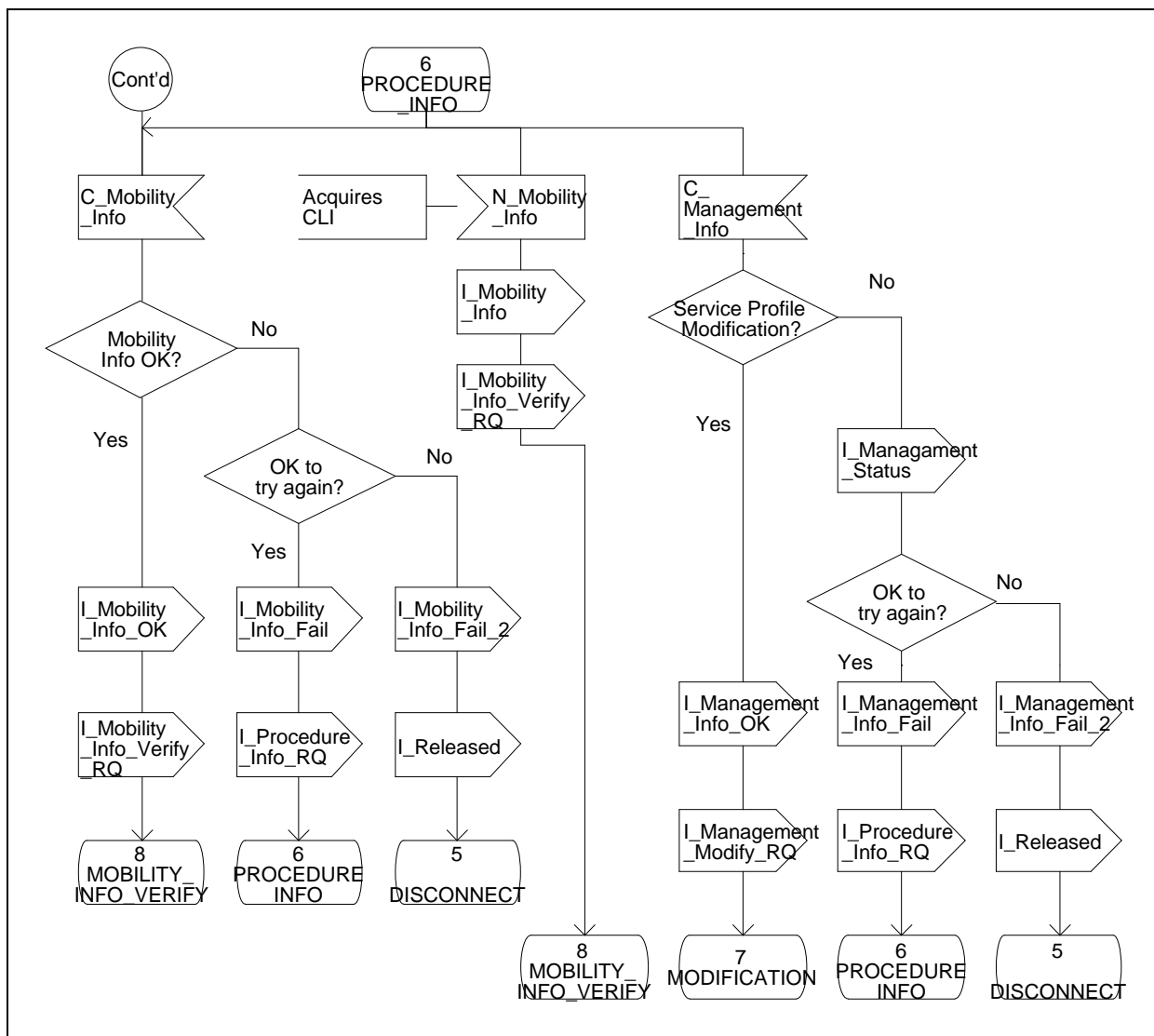


Figure A.8: (concluded) SDL procedures from state 6 - PROCEDURE\_INFO

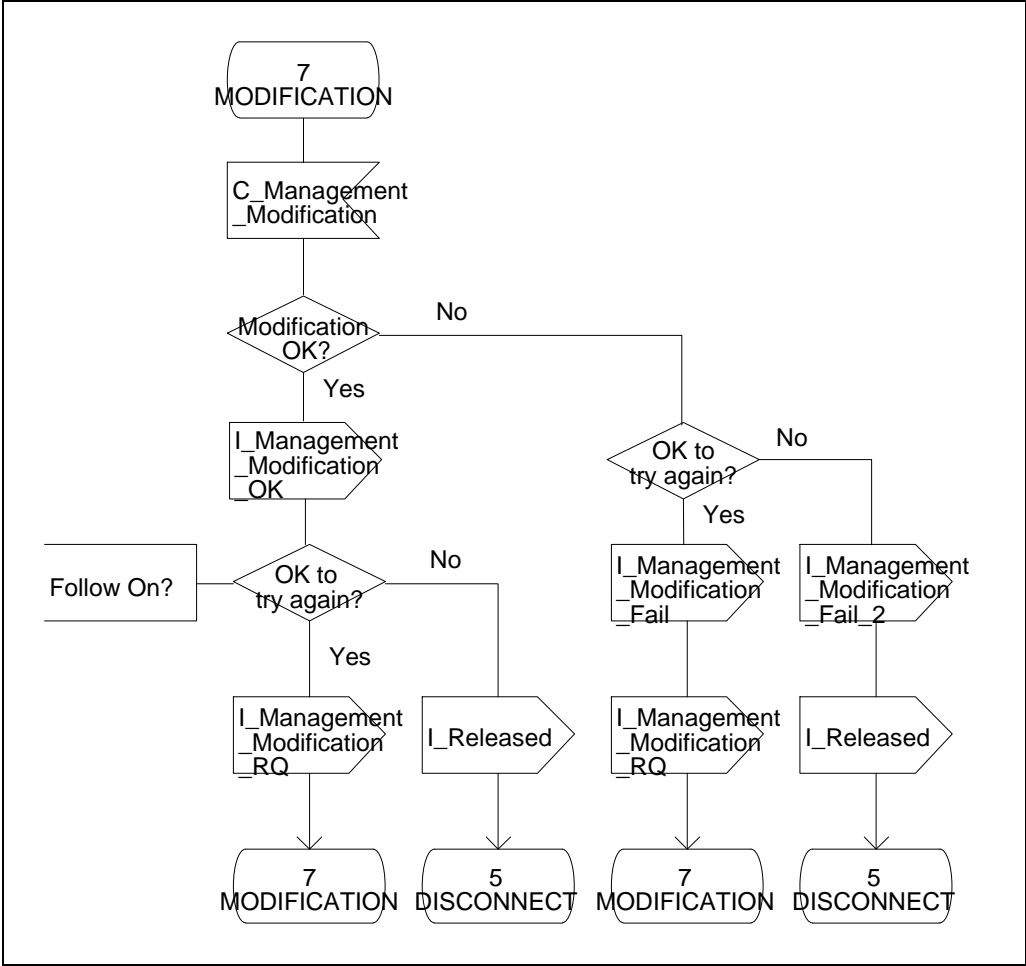


Figure A.9: SDL procedures from state 7 - MODIFICATION

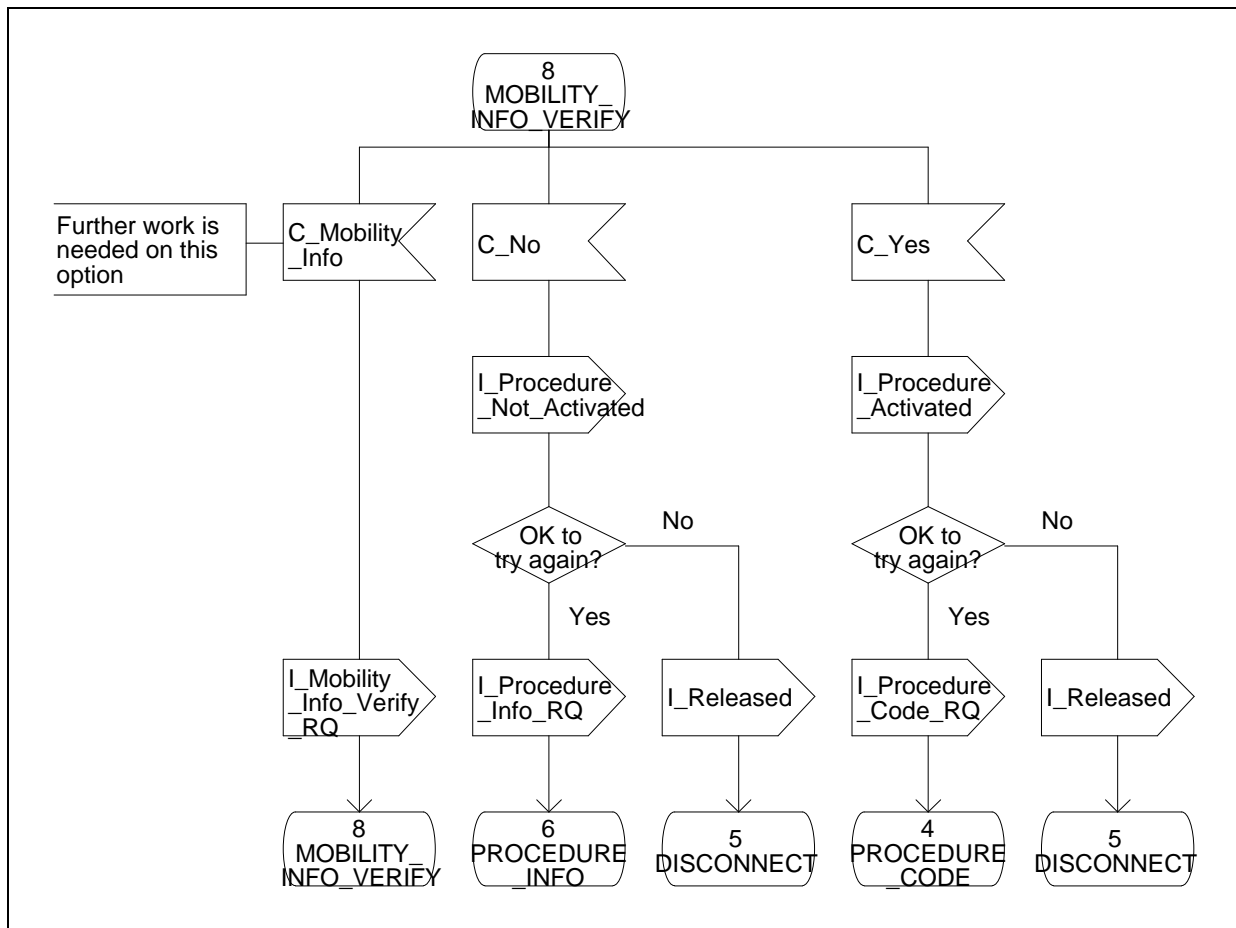


Figure A.10: SDL procedures from state 8 - MOBILITY\_INFO\_VERIFY

For Further Study

Figure A.11: SDL procedures from state 9 - FOLLOW\_ON

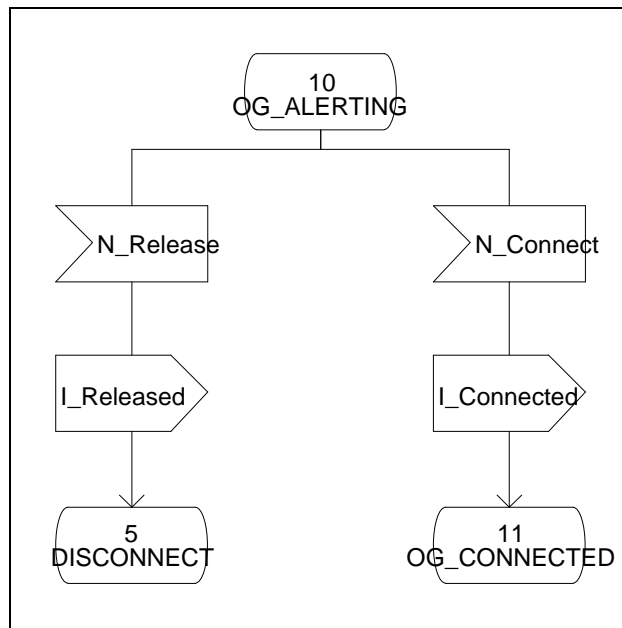


Figure A.12: SDL procedures from state 10 - OG\_ALERTING

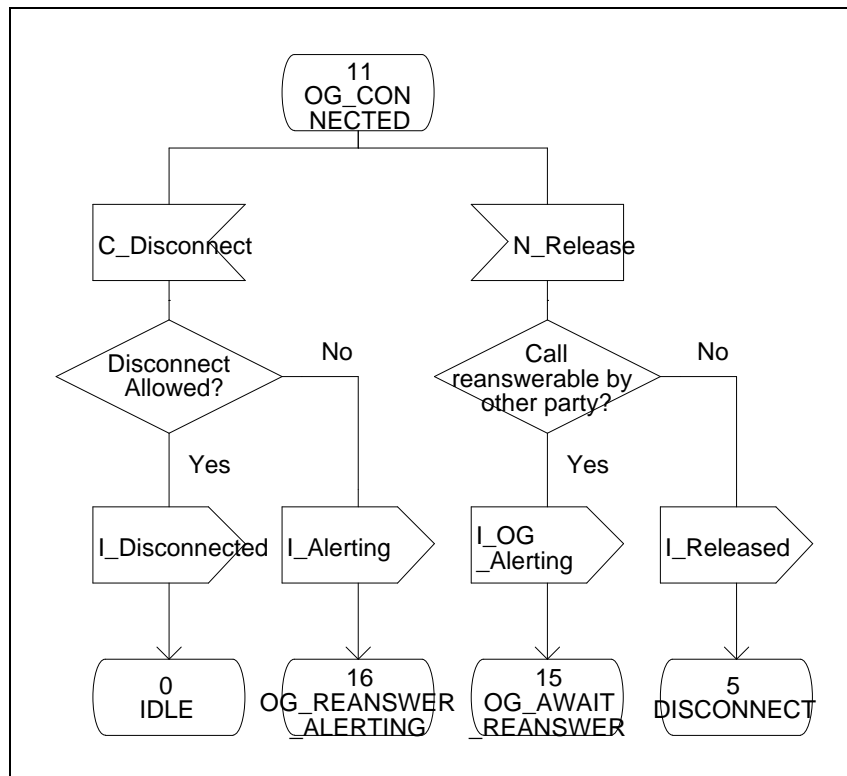


Figure A.13: SDL procedures from state 11 - OG\_CONNECTED

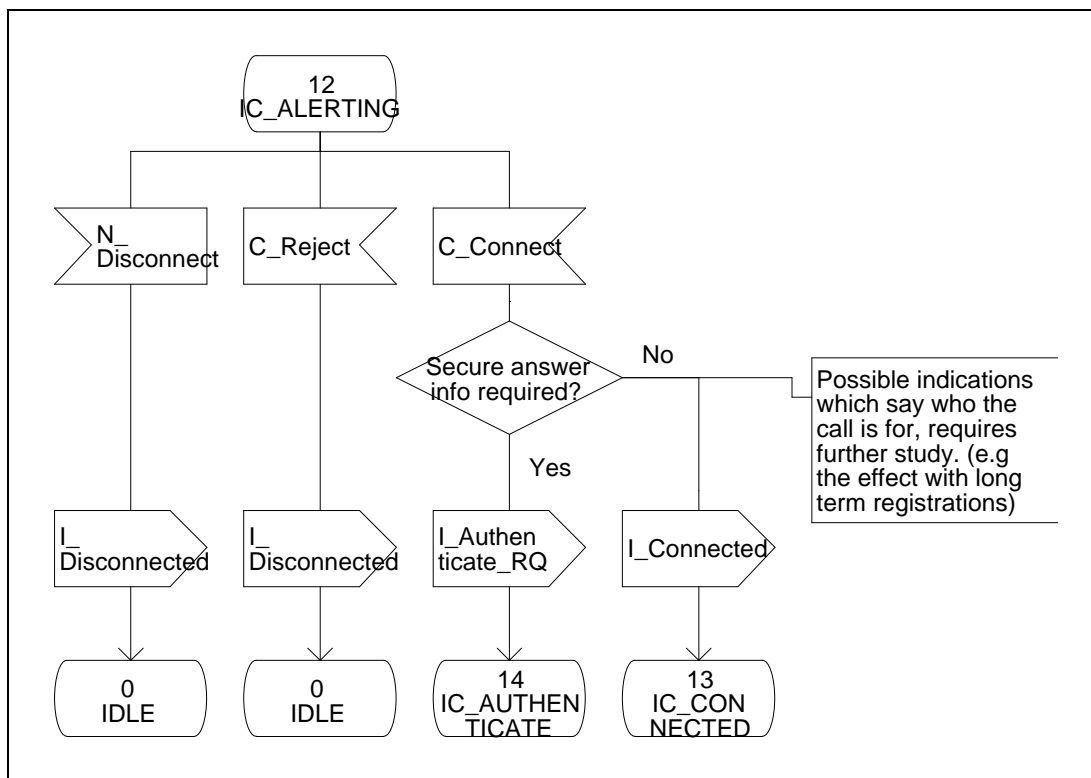


Figure A.14: SDL procedures from state 12 - IC\_ALERTING

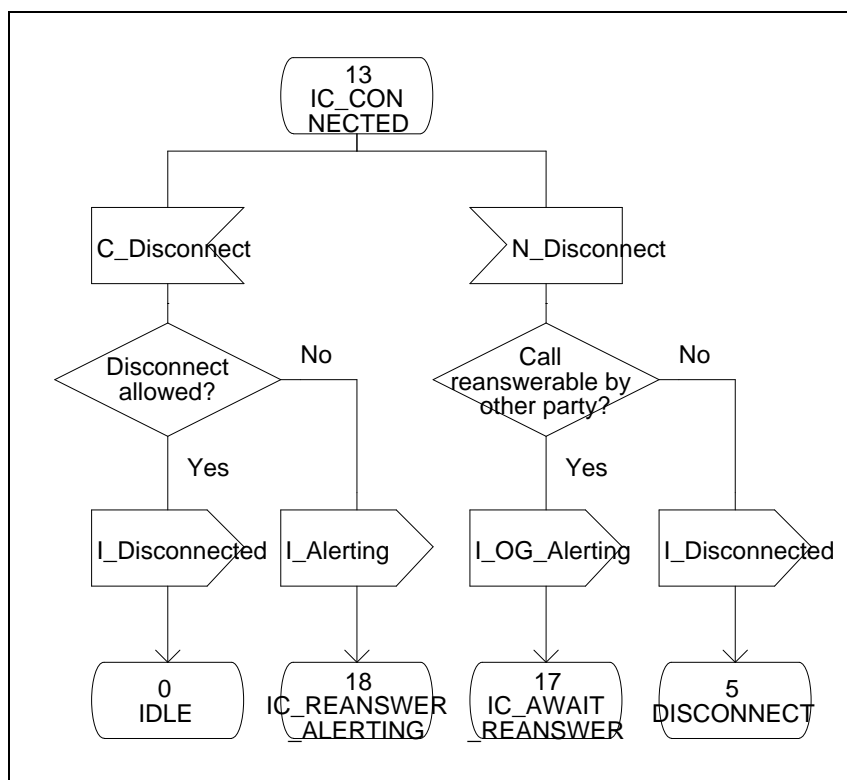


Figure A.15: SDL procedures from state 13 - IC\_CONNECTED

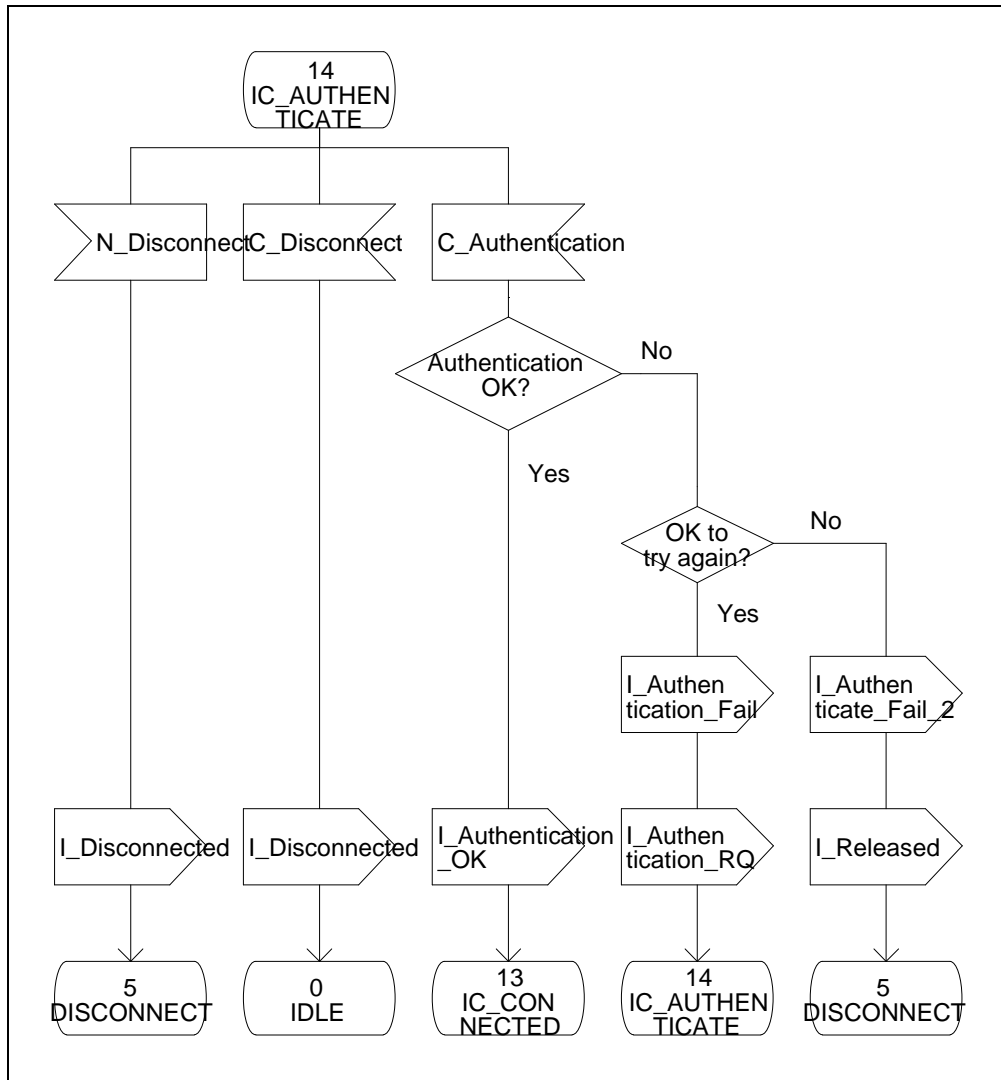


Figure A.16: SDL procedures from state 14 - IC\_AUTHENTICATE

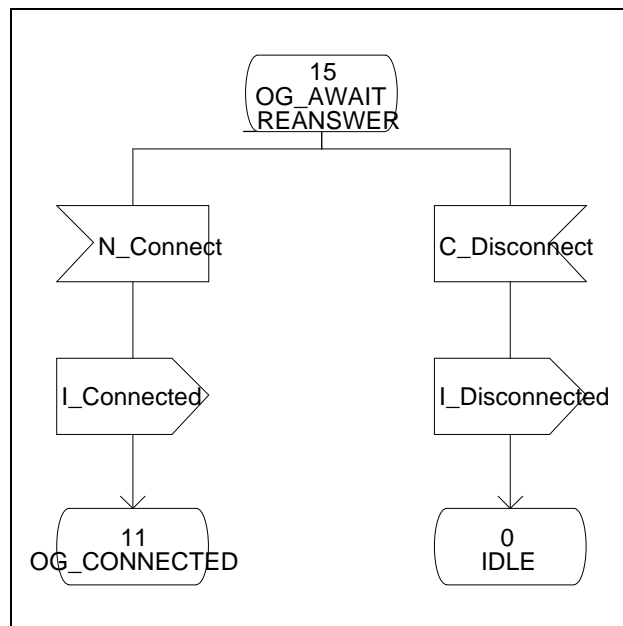


Figure A.17: SDL procedures from state 15 - OG\_AWAIT\_REANSWER

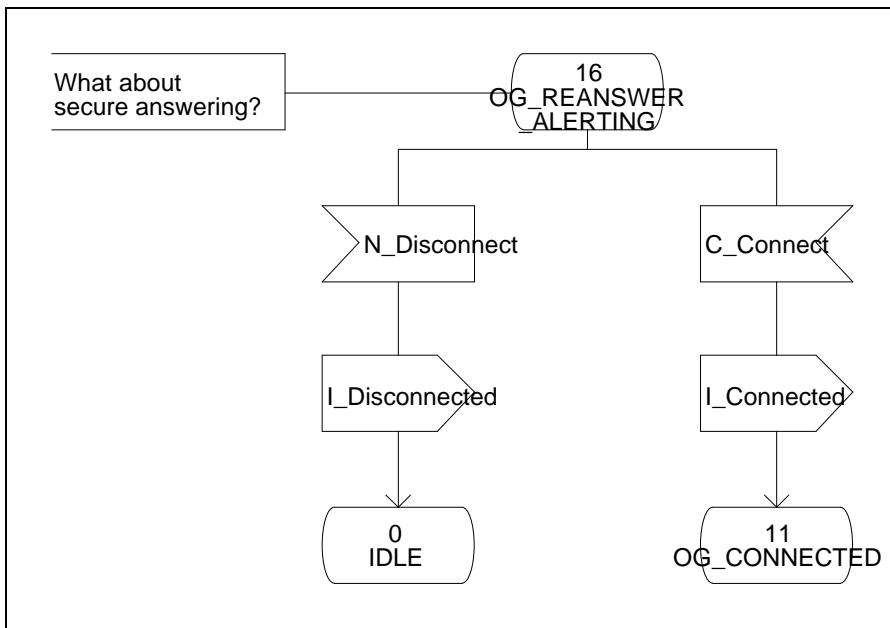


Figure A.18: SDL procedures from state 16 - OG\_REANSWER\_ALERTING

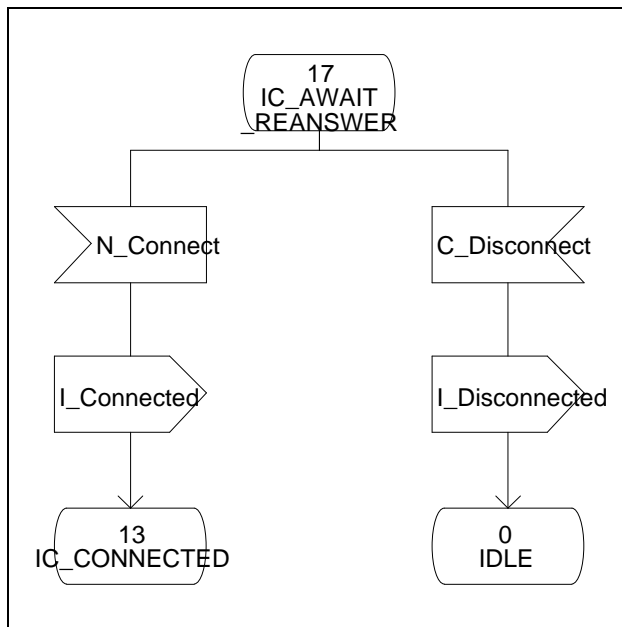


Figure A.19: SDL procedures from state 17 - IC\_AWAIT\_REANSWER



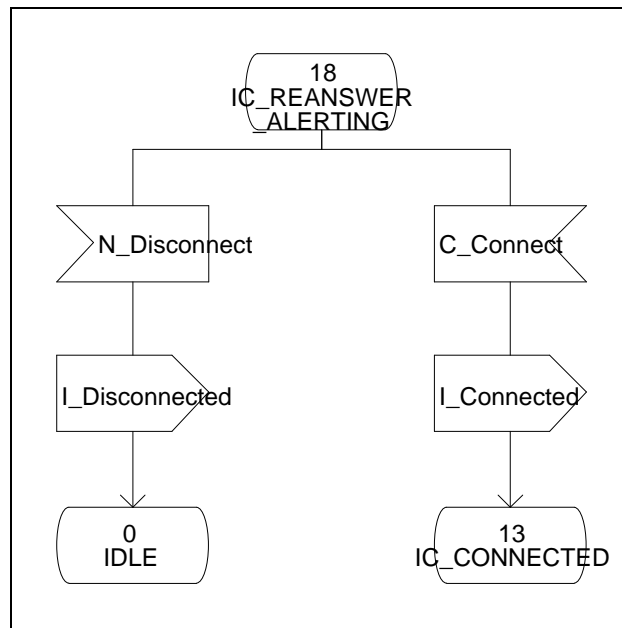


Figure A.20: SDL procedures from state 18 - IC\_REANSWER\_ALERTING

## A.6 Additional requirements

These are for further study.

## History

Document history	
September 1995	First Edition
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)