ETSI
ETSI TECHNICAL REPORT

ETR 218

November 1995

Source: ETSI TC-NA

Reference: DTR/NA-007006

ICS: 33.040

Key words: UPT, MMI

Universal Personal Telecommunication (UPT);
Phase 1 (restricted UPT service scenario);
Man-machine interface

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

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Foreword

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

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This ETR specifies the requirements for the Man-Machine Interface (MMI) for the Universal Personal Telecommunication (UPT) Phase 1 service, involving the UPT user, terminals and UPT access devices. It gives general Phase 1 requirements on MMI and associated procedures.

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1 Scope

This ETSI Technical Report (ETR) specifies the requirements for the Man-Machine Interface (MMI) for the Universal Personal Telecommunication (UPT) Phase 1 service, involving the UPT user, terminals and UPT access devices. It gives general Phase 1 requirements on MMI and associated procedures.

The MMI of the UPT Phase 1 service involves direct contact for the UPT user with terminals and the UPT access devices. The MMI discussed here, however, defines only the functional requirements for UPT-specific interactions. In addition, the MMI of the UPT service will involve the MMI given by any standard terminals used.

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]   ETR 217: "Universal Personal Telecommunication (UPT); Phase 1 (restricted UPT service scenario); User procedures and user states".

3 Abbreviations

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

ARA   Access Registration Address
CLI   Calling Line Identity
DTMF   Dual Tone Multi-Frequency
ISDN   Integrated Services Digital Network
LPIN   Local Personal Identification Number
MMI   Man-Machine Interface
PIN   Personal Identification Number
PSTN   Public Switched Telephone Network
PUI   Personal User Identity
UPT   Universal Personal Telecommunication
UPTAC   UPT Access Code

4 General requirements

UPT facilities should be easy to use and consistent across terminal types and geographic and network boundaries so as not to deter the users from using UPT.

Therefore, the users should not have to manually enter a large amount of information to use basic UPT features, and the UPT procedures and authentication protocol must be consistent regardless of the local UPT service provider used.

This clause provides guidelines for the design of basic procedures for the use UPT Phase 1 interactive services using Dual Tone Multi-Frequency (DTMF) input and voice response. The UPT services are accessible from any DTMF telephone, or from pulse-dialling telephones with the use of an adjunct DTMF dialling device. Consequently, the user's control of the service must be accomplished solely by the use of the 12 buttons of the DTMF dial (0-9, plus * and #). Recorded spoken messages, called "prompts," are used to provide choice, guidance and feedback to users, and to ask for input of data such as telephone numbers, account numbers, time of day, etc. Choices are provided on the form of spoken "menus" that indicate which response (DTMF button) is associated with each available choice.

If these guidelines are carefully observed, and good human factors design practice are followed, users should find UPT services easy to use, enhancing user satisfaction with them.

General guidelines

Menus should be kept short, in order to avoid exceeding the capacity of the user's short-term memory. At the most six choices should be presented on a single menu.

EXAMPLE 1:	Use:	For the Sales Department, press 1; for the service department, press 2; for general inquires, press 3.
	Not:	For the Clothing Sales Department, press 1; for Appliance Sales, press 2; for the Parts Department, press 3; for Appliance Service, press 4; for information on new shipments, press 5; for schedule information, press 6; for general inquires, press 7.

When stating choices in a menu, always present the choice first, then the action to achieve it.

EXAMPLE 2:	Use:	To send a message, press 1.
	Not:	Press 1 to send a message.

The benefits-to-cost ratio of the user access procedure should be optimized. In particular, for common and frequent procedures like call setup and call release, entering long strings of digits or codes and performing steps in a long sequence should be avoided or limited. The use of default modes and values, of logical or easily remembered codes, or of user-tailored menus are possible solutions. For example, the default limit on the length of incoming messages could be set to five minutes unless explicitly specified by the subscriber to an automatic telephone answering service.

The user procedures should be easy to learn. The design should make use of the users' familiarity with other similar services that already exist.

Users should be permitted to dial through prompts to indicate the desired choice as soon as it is presented, without waiting for the entire menu to be presented. This helps speed the use of the service and minimize user frustration.

Users should be permitted to dial ahead, providing the input that is needed without listening to the prompts at all. This permits experienced users to complete familiar procedures as quickly as possible.

EXAMPLE 3:	Upon reaching the remote call forwarding facility, the user dials the following digits in sequence, without stopping then hears a confirmation tone or message and hangs up:
	238641567186312

Here, "238641567" is the account number, "1863" is the Personal Identification Number (PIN), "1" chooses "Forward Calls" from the first menu, and "2" chooses "Terminate" from the second menu.

Messages should be provided in the language or languages preferred by the majority of users. If more than one language is provided, selection of the preferred language should be easy.

Help should always be available, and should be appropriate for the particular situation of the user when help is requested. For example a user requesting help after reaching "leave a message" in a voice mail service should be given specific information about leaving messages not the service generally. Help should also be provided in the case of apparent user difficulties (e.g. no user action for 5 seconds after a system prompt).

User-friendly error recovery procedures should be available to help the user go through new or complex procedures. For example, upon entering invalid information, the user should be asked to repeat just the last step, not to start the entire procedure from the beginning.

Status information should be available to users where appropriate to avoid the need for users to hold more information than necessary in memory.

Prompts should be as brief as possible, to speed up the service, without sacrificing comprehensibility.

EXAMPLE 4:   Use: "Welcome to ABC, Please enter account number, followed by hash".

                Not: "Welcome to the Automatic Billing and Collection Service. Please enter your account number, then press the hash button.

Provide immediate feedback to confirm user input. Feedback can take many forms; for example, if the user dials through a prompt, the prompt should be terminated at once to inform the user that the input was received.

Provide verification of critical data.

EXAMPLE 5:   "Your calls will be sent to 123 45 67 until 17:35. if this is correct, press 1; if incorrect, press 2".

                The speed of the interactive dialogue should meet the user requirements in the different circumstances.

    EXAMPLE 5.1:   The system response time to PIN validation should be short.

    EXAMPLE 5.2:   The timeout between digits when entering long strings should not be so short as to create anxiety in the user.

Provide a way to rehear the options in the current menu.

Provide a way to return to the main menu from any point in the service.

Provide a way to reach an attendant or operator (if available) for assistance from any point in the service.

Consistency within the interface (procedures, messages, commands, vocabulary, codes) is very important. Therefore, the same command should always be used to access help; the same delimiter should be used to indicate the end of input; etc. The same terminology (vocabulary) should be used throughout all the features of the service.

The command names should be meaningful, unambiguous, and easy to recall or remember.

Set usability objectives for the service. For example, one usability objective might be the average user should be able to complete registration 95% of the time within 2 minutes after pressing the first key for entry.

Conduct usability tests on prototypes of the service, and modify prompts and call flows accordingly.

EXAMPLE 6 (from UPT):   Use: For InCall, press 1.

                Not: Press 1 for InCall.

5 Specification principles

The standardized MMI of the UPT service specifies the minimum level of requirements, with emphasis on items which are seen as important from aspects of service and terminal independence, or from a global roaming point of view. Any additional MMI aspects are left to the equipment manufacturers for innovation.

This means that the requirements mainly deal with standardized control procedures for access to the UPT service, i.e. the MMI aspects of the UPT procedures. This also includes standard UPT-specific announcements to the UPT users. Any call control procedures of the specific networks and services used are outside the scope of the UPT MMI specification.

As far as possible, the standardized MMI is restricted to the sequences of logical actions and events. Physical implementations of these are as far as possible left to the equipment manufacturers for innovation.

6 MMI aspects of the UPT procedures

The MMI aspects of the UPT procedures may vary physically to some extent, e.g. in terms of authentication and the use of UPT access devices. They will also depend on the services and terminals used, with different inputs and outputs. However, logically the UPT procedures should all follow the same general pattern, as illustrated in figure 1 and the following text.
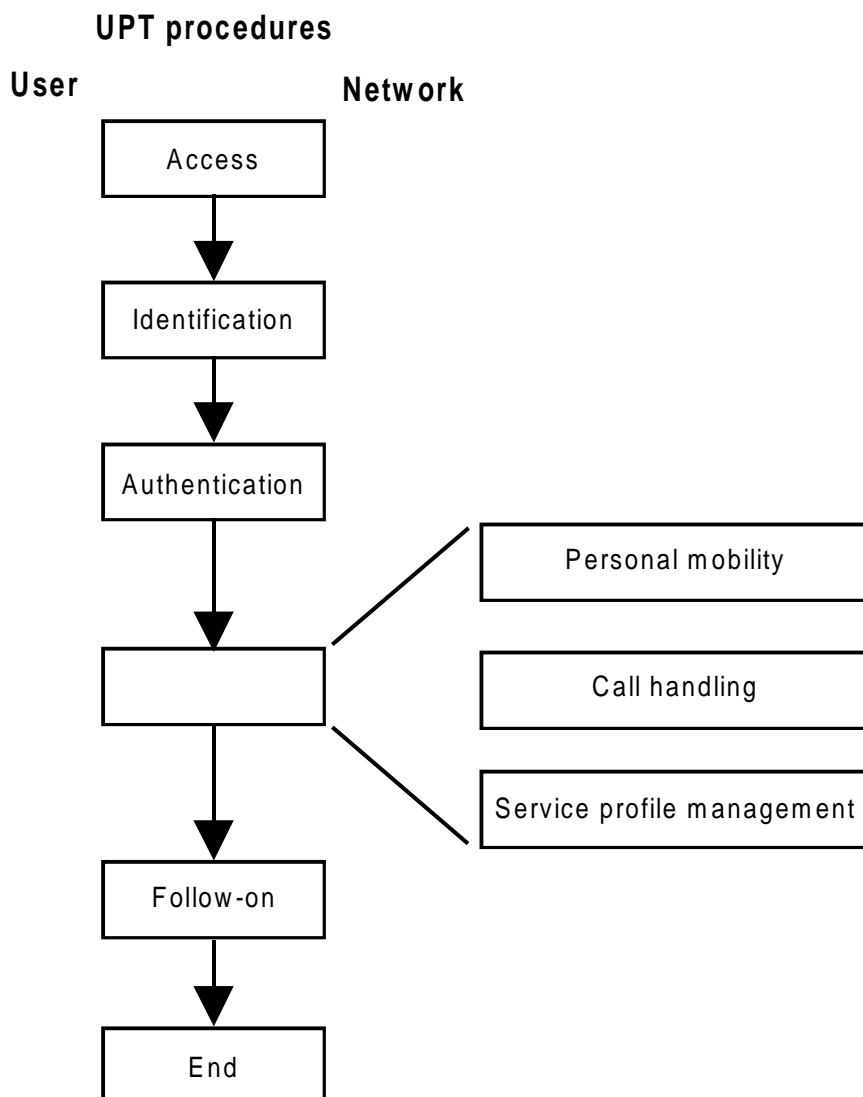
UPT procedures

User   **Network**

Figure 1

A) **Elementary procedures:**

the elementary procedures are generally common and precursor for all the main UPT procedures and they comprise of the following:

1) the UPT user accesses the UPT facilities;

2) the UPT user identifies himself;

3) the UPT user is authenticated, if required.

B) **UPT procedure specification:**

4) the required UPT procedure is specified by the UPT user;

The realization of the main UPT procedures are described in four categories:

- personal mobility

- UPT call handling

- UPT service profile management

The sequencing of the main UPT procedures is variable, depending upon previous actions.

C) **UPT elementary procedure termination:**

5) the UPT user terminates UPT procedure or indicates the following:

- global follow-on;

- OutCall follow-on.

6.1 MMI description of UPT procedures

6.1.1 Realization of elementary procedures

Before, or as part of, any of the normal UPT procedures, a set of elementary procedures may be carried out. These procedures may include access, identification and authentication, as well as follow-on. These procedures are generically described in subclause 4.1 of ETR 217 [1].

The UPT user may, however, have a choice between various security levels and UPT access devices for these procedures, and the implementation of the various scenarios depends on the services and networks used. This is to be decided by the UPT service provider for each implementation phase.

This subclause, therefore, defines two sets of distinct types of elementary procedures:

1) simple one-way authentication protocol with fixed PIN;

2) advanced one-way authentication protocol with variable Authentication Code (AC).

6.1.1.1 Type 1 elementary procedure (simple one way protocol)

The procedures for type 1 (simple one way protocol) have been included for completeness, even though they may not be specified.

The type 1 elementary procedures are characterised by an authentication protocol which uses one-way transmission with fixed PINs and number of access attempt limitations.

The type 1 elementary procedures may be realized in various ways like, for example:

- without UPT access device and manual dialling (intended for any terminal with a DTMF type key pad, and for communication in any network);

- a simple sending DTMF-type UPT access device (intended for most voice terminals with a key pad, and communication in Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN) or similar networks). DTMF-type UPT access devices of this kind may include a key pad;

- a simple sending modem-type UPT access device (intended for most voice terminals with a key pad, and communication in PSTN, ISDN or similar networks). Modem-type UPT access devices of this kind may include a key pad;

- a magnetic strip card (intended for terminals with a key pad and magnetic strip card readers, and communication in any network);

- etc.

The UPT service provider and the UPT user both know the UPT user's public identity, which is the UPT number. In addition, the UPT user's Personal User Identity (PUI) may be known to the UPT service provider. The PUI does not need to be known to the UPT user. Depending on whether the UPT number or the PUI is used for user-network signalling, one or the other is stored as permanent information in the UPT access device, if used.

The UPT user and the UPT service provider also share a secret PIN, which is stored only in the network.

The procedures work as follows:

- **access:**

    a) the UPT user prepares the terminal for communication (off-hook);

    b) the UPT user couples the UPT access device, if used, to the terminal. For a DTMF-or modem-type device, this is carried out acoustically, and for a magnetic strip card magnetically by sliding the card through the card reader;

    c) the UPT user accesses the UPT service. For DTMF- and modem-type UPT access devices and if no UPT access device is used, this is by default carried out manually by dialling a UPT Access Code (UPTAC) on the terminal. If a DTMF-type device is used, and the voice network uses DTMF signalling, this may also be carried out through the UPT access device, either manually or automatically by using default information stored in the UPT access device upon activation of the SEND function in the UPT access device. For a magnetic strip card, this is carried out automatically when coupled to the terminal;

- **identification:**

    d) the UPT user identifies himself. If a UPT access device is used, the identification information is stored permanently in the UPT access device, and is passed to the UPT service provider. This is carried out automatically when coupled to the terminal in the case of a magnetic card, and by activation of a SEND function in the UPT access device in the case of a DTMF - or modem-type device;

-    **authentication:**

   e)   the network requests authentication of the user. This is carried out by manually entering a PIN on the terminal. In the case of a DTMF - or a modem type device, this may also be carried out through the UPT access device when activating the SEND function, provided the PIN had been entered on the UPT access device first. The PIN is erased from memory in the UPT access device upon activation of the SEND function;

   f)   the network authenticates the UPT user. This is carried out by comparing the identities and PIN's and feeding back appropriate information tones or announcements to the UPT user to indicate the result of the authentication;

   g)   if the input identities and PIN's equal the corresponding information in the network, then the authentication is successful, and a positive response is provided to the UPT user. Otherwise, this is an authentication failure, and a negative response is given;

   h)   in case of a successful authentication, the UPT user may proceed with the UPT procedure specification. This may be carried out manually on the terminal by dialling the UPT procedure code, or manually through the UPT access device upon activation of the SEND function, if the UPT access device includes a key pad;

   i)   if the UPT user fails to authenticate N times, the UPT service profile is blocked, and no further UPT procedure from the UPT user are accepted. The UPT user will have to contact the UPT service provider for unblocking of his UPT service profile;

   j)   when terminating the UPT procedure carried out, the UPT user may terminate completely (on-hook) or he may wish to indicate follow-on. This may be carried out manually on the terminal by dialling a follow-on code followed by the UPT procedure code, or manually through the UPT access device upon activation of the SEND function, if the UPT access device includes a key pad.

   NOTE: The use of the temporary storage and the SEND function in the UPT access device in the various points above may be combined as appropriate.

6.1.1.2   Type 2 elementary procedures (advanced one-way protocol)

The type 2 elementary procedures are characterized by an authentication protocol which uses one-way transmission, but with a variable Authentication Code (AC). In addition, a Local PIN (LPIN) is used between the UPT user and the UPT access device. The number of access attempts is unlimited.

The type 2 elementary procedures always require a UPT access device and may be realized in various ways like, for example:

-    an advanced sending DTMF-type UPT access device (intended for most voice terminals with a key pad, and communication in PSTN, ISDN or similar networks). DTMF-type UPT access devices of this type must include a key pad;

-    an advanced sending modem-type device (intended for most voice terminals with a key pad, and communication in PSTN, ISDN or similar networks). Modem-type UPT access devices of this kind must include a key pad;

-    etc.

The UPT service provider and the UPT user both know the UPT user's public identity, which is the UPT number. In addition, the UPT user's PUI may be known to the UPT service provider. The PUI does not need to be known to the UPT user. Depending on whether the UPT number or the PUI is used for user-network signalling, one or the other is stored as permanent information in the UPT access device.

The UPT user and the UPT access device also share a secret LPIN, which is stored in the UPT access device. In addition, the UPT service provider and the UPT access device share a common cryptographic algorithm, a secret key and a sequence number for authentication.

The procedures work as follows:

- **access:**

    a)   the UPT user prepares the terminal for communication (off-hook);

    b)   the UPT user couples the UPT access device to the terminal. For the DTMF-or modem-type device applicable to these procedures, this is carried out acoustically;

    c)   the UPT user accesses the UPT service. This is by default carried out manually by dialling a UPTAC on the terminal. If a DTMF-type device is used, and the voice network uses DTMF signalling, this may also be carried out through the UPT access device, either manually or automatically by using default information stored in the UPT access device upon activation of a SEND function in the UPT access device. This will connect the UPT user to the appropriate device in the network (e.g. modem- or DTMF-device);

- **identification:**

    d)   the UPT user identities himself. The identification information is stored permanently in the UPT access device, and is passed to the UPT service provider. This is carried out by activation of a SEND function in the UPT access device;

- **authentication:**

    e)   the UPT system requests authentication. This is carried out by the user through manually entering a PIN on the UPT access device and activating the SEND function. As a result, a variable AC is passed to the network transparently through the terminal. This AC varies according to a common algorithm in synchronisation between the UPT service provider and the UPT access device;

    f)   the network authenticates the UPT user. This is carried out by comparing the identities and AC's. As a result, the network will feed back appropriate information tones or announcements to the UPT user to indicate the results of the authentication;

    g)   if the input identities and AC's equal the corresponding information in the network, then the authentication is successful, and a positive response is provided to the UPT user. Otherwise, this is an authentication failure and a repetition request is fed back to the user;

    h)   in case of a successful authentication, the UPT user may proceed with the UPT procedure specification. This may be carried out manually on the terminal by dialling the UPT procedure code, or manually through the UPT access device upon activation of the SEND function;

    i)   if the sequence number is out of range. the UPT user has to contact the service provider in order to resynchronize;

    j)   when terminating the UPT procedure carried out, the UPT user may terminate completely (on-hook) or he may wish to indicate follow-on. This may be carried out manually on the terminal by dialling a follow-on code followed by the UPT procedure code, or manually through the UPT access device upon activation of the SEND function.

    NOTE: The use of the temporary storage and the SEND function in the UPT access device in the various points above may be combined as appropriate.

6.1.2 Realization of the UPT procedure specification

Following a successful set of elementary procedures (access, identification and authentication procedures), the actual UPT procedure required will have to be specified by the UPT user. In these procedures the UPT user will have to specify the mandatory and optional UPT procedure parameters.

If no parameters are specified then default parameters from the service profile are assumed.

For a definitive list of optional and mandatory parameters please refer to ETR 217 [1].

Common procedure format

The following sequence is common to all the procedures:

a)   on successful completion of the access, identification and authentication procedures, the network prompts the user for the UPT procedure required;

b)   the UPT user enters the procedure code for the required UPT procedure. The UPT user does not have to wait for the network prompt, but can specify the wanted procedure without delay;

c)   if no information is returned to the network in a specified time, the prompt is repeated N times or for a certain duration. If no information is returned by the UPT user within a specified time, the UPT user is presented with the table of available UPT procedures. If still no response from the UPT user is received within a specified time, the connection is cleared down;

d)   on verification that the wanted UPT procedure is allowed, the network prompts the user to specify the parameters for the wanted UPT procedure.

All UPT user input in this part of the UPT procedures is normally carried out manually on the terminal. However, if the UPT user uses a UPT access device and the UPT access device has a key pad, it may also be carried out manually through the UPT access device, upon activation of the SEND function, if any.

6.1.2.1 Personal mobility procedures

6.1.2.1.1 InCall registration (registration for incoming calls)

Registration for Incoming calls is a means for a UPT user to indicate where incoming calls shall be presented. Such a registration will override any previous registration.

a)   one verification that the InCall registration procedure is allowed, the network prompts the user for optional information, such as: duration of registration, number of incoming calls, One or more Access Registration Addresses (ARAs), if needed, for registration, etc. (for complete list of optional information, refer to ETR 217 [1]);

b)   if no identity or insufficient digits are supplied the network prompts the user n times, or for a certain duration, before terminating the activity. If the identity is obtained automatically the network prompts the user for another procedure, the identity may be obtained by the network automatically in some cases, i.e., calling line identity;

c)   on receipt of the terminal identity, the network prompts the user to verify or confirm the number. This may not be necessary if the Calling Line Identity (CLI) is obtained automatically;

d)   the user responds either positively or negatively by entering the appropriate digits;

e)   the network confirms InCall registration. The procedure is terminated. The user is allowed to activate the Follow-on procedure;

f)   if no response is received, the network terminates the activity;

g)   alternatively, the user terminates the activity (e.g. going on-hook).

6.1.2.1.2 InCall deregistration (deregistration for incoming calls)

The various way a deregistration for Incoming calls can occur are described in ETR 217 [1]. This procedure only refers to explicit deregistration by the user.

A user who has registered to receive incoming calls can deregister (cancel) his registration in the following way:

a)   on verification that the InCall Deregistration procedure is allowed, the network prompts the user to enter the optional information: One or more ARAs to be deregistered for example (refer to ETR 217 [1] for full list of optional information);

b)   if no identity, or insufficient digits are supplied the network prompts the user n times or for a certain duration, before terminating the activity. If no address is specified, the address of the used terminal is assumed. If no service is specified, all services for which the registration applied are assumed;

c)   on receipt of the optional information, the network may prompt the user to verify or confirm the number(s);

d)   the user responds either positively or negatively by entering the appropriate codes, if requested;

e)   the network confirms InCall deregistration for Incoming Calls. The procedure is terminated;

f)   the user may activate the Follow-On procedure. If no response is received, the network terminates the activity;

g)   alternatively, the user terminates the activity (e.g. going on-hook).

6.1.2.2 UPT call handling procedures

6.1.2.2.1 Outgoing UPT call setup

This procedure is used by a UPT user in order to make a single outgoing UPT call independent of any previous registrations by himself or any other UPT user.

a)   on receipt of the desired procedure prompt, the UPT user enters the procedure code for Outgoing UPT Call and B-party address;

b)   if no number, or insufficient digits are supplied the network prompts the user n times or for a certain duration, before terminating the activity;

c)   on receipt of the B-party address, the network commences the establishment of the call;

d)   on completion of the call. The user may activate the follow-on procedure;

e)   if no response is received, the network terminates the activity;

f)   alternatively, the user terminates the activity (e.g. going on-hook).

6.1.2.3 UPT service profile management

The UPT user will be allowed very limited management of his/her own profile data. The two procedures for service profile management are as described in subclauses 6.1.2.3.1 and 6.1.2.3.2.

6.1.2.3.1 UPT service profile interrogation

A UPT user uses the profile interrogation procedure to obtain information on the current status of the UPT user's own service profile:

a)   on verification that the UPT service profile management interrogation procedure is allowed, the network prompts the user to enter the optional information, the exact choice of information is a service providers choice;

b)   if no code, or inappropriate information, is supplied the network may guide the user through the available options;

c)   on completion of the procedure, the user may activate the Follow-on procedure;

d)   if no information is received in the network on the completion of the procedure the network terminates the activity;

e)   alternatively, the user terminates the activity (e.g. going on-hook).

The detailed process for service profile interrogation will be left to the operator/service provider to specify.

6.1.2.3.2 UPT service profile modification

The profile modification procedure is a procedure by which the UPT user can change appropriate UPT service profile parameters:

a)   on verification that the UPT service profile modification procedure is allowed, the network prompts the user to enter the optional information, the exact choice of optional information is a choice of the service provider;

b)   if no code, or inappropriate information, is supplied the network may guide the user through the available options;

c)   on completion of the procedure, the user may activate the follow-on procedure;

d)   if no information is received in the network on the completion of the procedure the network terminates the activity;

e)   alternatively, the user terminates the activity (e.g. going on-hook).

The detailed process for service profile modification will be left to the operator/service provider to specify.

6.2 Standard UPT announcements

6.2.1 Types of standard UPT announcements

The presentation of UPT-specific standard announcements will depend on the terminal, network or service used. However, the presentation of these announcements can only be given in one of three forms:

1) as an alphanumeric message in an appropriate language;

2) as a voice message in an appropriate language;

3) as non-alphanumeric symbols.

The choice of presentation may vary, but the contents of the announcement should be the same in at least the two first cases. As far as possible, the announcements should be given in a language of the UPT user's choice.

6.2.2 List of standard UPT announcements

ETSI Technical Committee Human Factors (TC-HF) is responsible for guidelines to be used in the specification of UPT announcements.

6.3 UPT procedure

ETSI TC-HF is responsible for the development of UPT procedures.

History

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