

**Universal Personal Telecommunication (UPT);  
UPT phase 2;  
Requirements on information flows and protocols**

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# Contents

Intellectual Property Rights.....	5
Foreword .....	5
1 Scope.....	6
2 References.....	6
3 Symbols and abbreviations .....	6
3.1 Symbols .....	6
3.2 Abbreviations.....	7
4 General.....	8
5 Description of the requirements for UPT Phase 2 .....	8
5.1 Authentication.....	8
5.1.1 Call related in-band procedure case .....	9
5.1.2 Call related out-channel procedure case (based on DTMF or DSS1).....	11
5.1.3 Call unrelated procedure case .....	11
5.2 Incoming call .....	13
5.2.1 Incoming Call with described service assistance.....	13
5.2.2 Alternative Incoming call, with triggers on originating and terminating sides .....	15
5.3 Secure Answering for Incoming UPT Calls.....	21
5.3.1 Scenario 1.....	22
5.3.2 Scenario 2.....	23
5.3.3 Scenario 3.....	24
5.4 Registration/Deregistration for Outgoing Calls.....	25
5.4.1 Impact of the outgoing call scenarios on general UPT procedures .....	26
5.4.2 Registration for outgoing calls (solution a) .....	27
5.4.3 Deregistration for outgoing calls (solution a).....	32
5.5 Outgoing UPT Calls when already registered.....	36
5.5.1 Outline description .....	36
5.5.2 Information flow diagrams .....	37
5.5.2.1 Access to UPT for outgoing UPT call when registered in case of scenario a): the line at which the user is registered is temporary marked .....	38
5.5.2.2 Outgoing UPT call when registered (end of procedure) .....	39
5.6 Incall Registration procedure.....	46
5.6.1 Information Flows in call unrelated scenario .....	47
5.7 Call Pick-up .....	48
5.7.1 Scenarios .....	48
5.7.2 User Procedures .....	49
5.7.3 Information Flows .....	51
<b>Annex A (normative): Alternative description for some procedures when access to outgoing call for a registered UPT user is via scenario c) .....</b>	<b>55</b>
A.1 Information flows for UPT phase 2 .....	55
A.2 Procedures for personal mobility .....	57
A.2.1 Registration for UPT outgoing calls .....	57
A.2.1.1 Outgoing call registration.....	57
A.2.2 Deregistration for UPT outgoing calls .....	63
A.3 UPT call handling procedures.....	67
A.3.1 Outgoing UPT call for a non-registered UPT user.....	67
A.3.2 Outgoing UPT call for a registered UPT user - scenario c) .....	67
A.3.2.1 Outline description .....	67
A.3.2.2 Information flow diagrams .....	68

A.3.2.2.1	Access to UPT for outgoing UPT call when registered in case of scenario c): the UPT user dials the UPTAC to indicate that the Outgoing call procedure has to be activated but PUI was NOT associated to the CLI in the SDFo at registration time .....	69
A.3.2.2.2	Access to UPT for outgoing UPT call when registered in case of scenario c): the UPT user the UPTAC to indicate that the Outgoing call procedure has to be activated but PUI and CLI were associated in the SDFo at registration time.....	71
A.3.2.2.3	Outgoing call for a registered user (network side).....	73
History .....		81

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## Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Network Aspects (NA).

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## 1 Scope

The present document collects specific UPT phase 2 requirements on the Information Flows (IFs). It is a delta document compared to the phase 1 information flows (TCR-TR 040 [4]) and presents examples for specific UPT phase 2 procedures or new scenario for UPT procedures being already in phase 1.

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

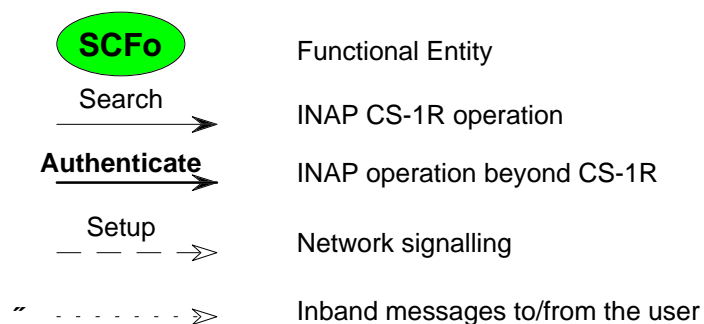
- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] EG 201 076: "Network Aspects (NA); Universal Personal Telecommunication (UPT); Phase 2: Architecture and functionalities for interworking".
- [2] ETS 300 790: "Universal Personal Telecommunication (UPT); Security architecture for UPT phase 2; Specification".
- [3] ITU-T Recommendation Q.1224: "Distributed functional plane for Intelligent Network Capability Set 2".
- [4] TCR-TR 040: "Universal Personal Telecommunication (UPT); Phase 1; Requirements on Information Flows (IFs) and protocols".
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## 3 Symbols and abbreviations

### 3.1 Symbols

For the purpose of the present document, the following symbols are used:



**Figure 3.1: IFs symbols**

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

Common abbreviations:

A	Calling User
AC	variable Authentication Code
B	Called User
BCSM	Basic Call State Model
CURUI	Call Un-Related User Interaction
IF	Information Flow
OCCRUI	Out-Channel Call Related User Interaction
PIN	Personal Identification Number
PUI	Personal User Identification
RAND	RANdOm number
SAPIN	Secure Answering Personal Identification Number
UPT	Universal Personal Terminal
UPTAC	UPT Access Code

Functional Entities:

CCAF	Call Control Agent Function
CCF	Call Control Function
CLI	Calling Line Identity
CUSF	Call Unrelated Service Function
CW	Call Waiting
IN	Intelligent Network
SCF	Service Control Function
SDF	Service Data Function
SMF	Service Management Function
SCUAF	Service Control User Agent Function
SRF	Specialized Resource Function
SSF	Service Switching Function

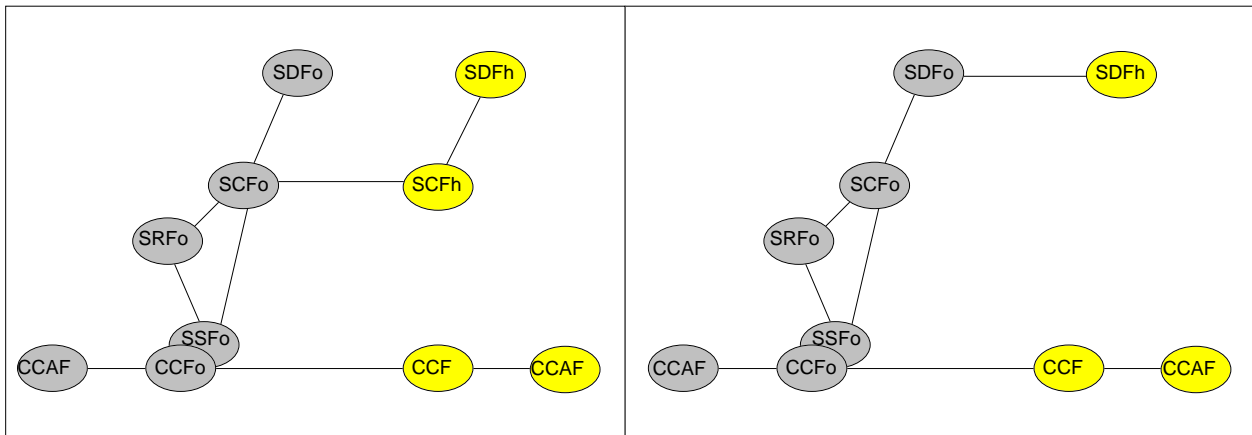
Information Flows:

ARI	Assist Request Instruction
COLL-UI	COLLected User Information
ETC	Establish Temporary Connection
EVREPBCSM	EVent REPort Basic Call State Machine
INITIALDP	INITIAL Detection Point
PLAYANN	PLAY ANNouncement
P&C	Prompt and Collect user information
REQREPBCSM	REQuest REPort Basic Call State Machine Event
SRFRPT	Specialized Resource Function RePorT

## 4 General

The following assumptions have been made:

- UPT phase 2 is based on IN CS-2;
- The functional architecture for the interconnection scenarios used in the description of the procedures is depicted in figure 1 (see EG 201 076 [1] "Phase 2 architecture and functionalities for interworking"). Two new interfaces can be used.



**Figure 4.1: UPT phase 2 Functional Architecture; SCF-SCF and SDF-SDF scenario**

- The UPT user's home network can be derived from the data the UPT user provides the visited network, as well as the service provider and home database. This information is embedded in the parameter PUI.
- UPT user authentication is performed in the home database (SDFh) of the UPT user.
- In UPT Phase 2 the use of a "smartcard" for the UPT service is considered standard. Smart cards for a UPT service have the capability to generate a signed result from a random number given by the home SDFh of the UPT-user. The SDFh does the exact same calculation and verifies the smart card result. This is similar to the way user verification is done in GSM. An enhanced level of protection is achieved in this way.
- Transfer of information between an IN controlled node and a terminal fitted with a smartcard- reader (for e.g., Strong Authentication procedures) imposes the use of Out Channel User Interactions (OCCRUI and CURUI).
- Depending on the availability of the Service Profile Transfer feature in IN CS-2 different interworking scenarios could be used between operators according to mutual agreements.

## 5 Description of the requirements for UPT Phase 2

### 5.1 Authentication

In the following the described authentication procedure may apply either to a calling or a called UPT user. As assumed, authentication executed in the home database (SDFh).

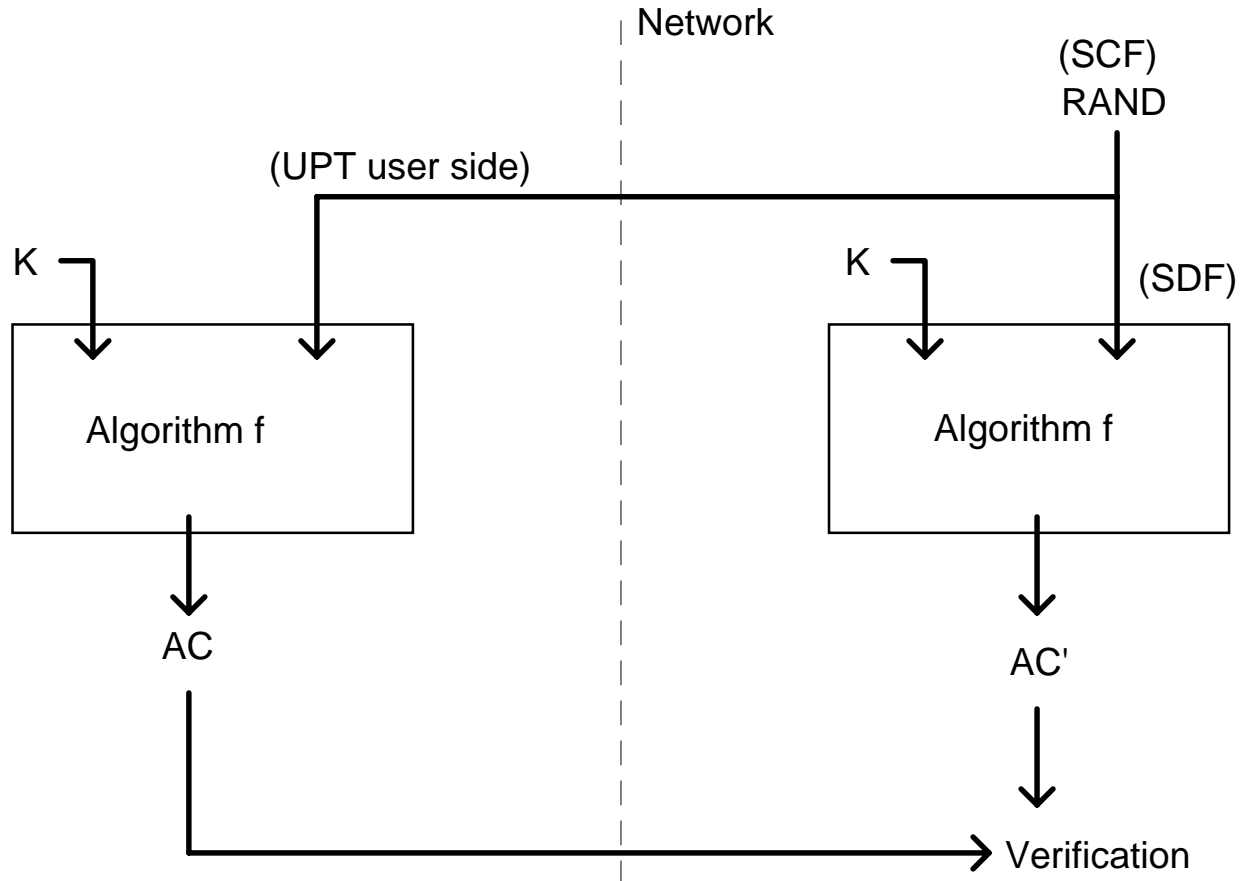
The authentication of the UPT user can be both call related (in-band or out-channel) or call unrelated, and weak (as in UPT phase 1) or two-pass strong.



### 5.1.1 Call related in-band procedure case

In that case, the phase 1 description applies for weak authentication or one-pass strong authentication.

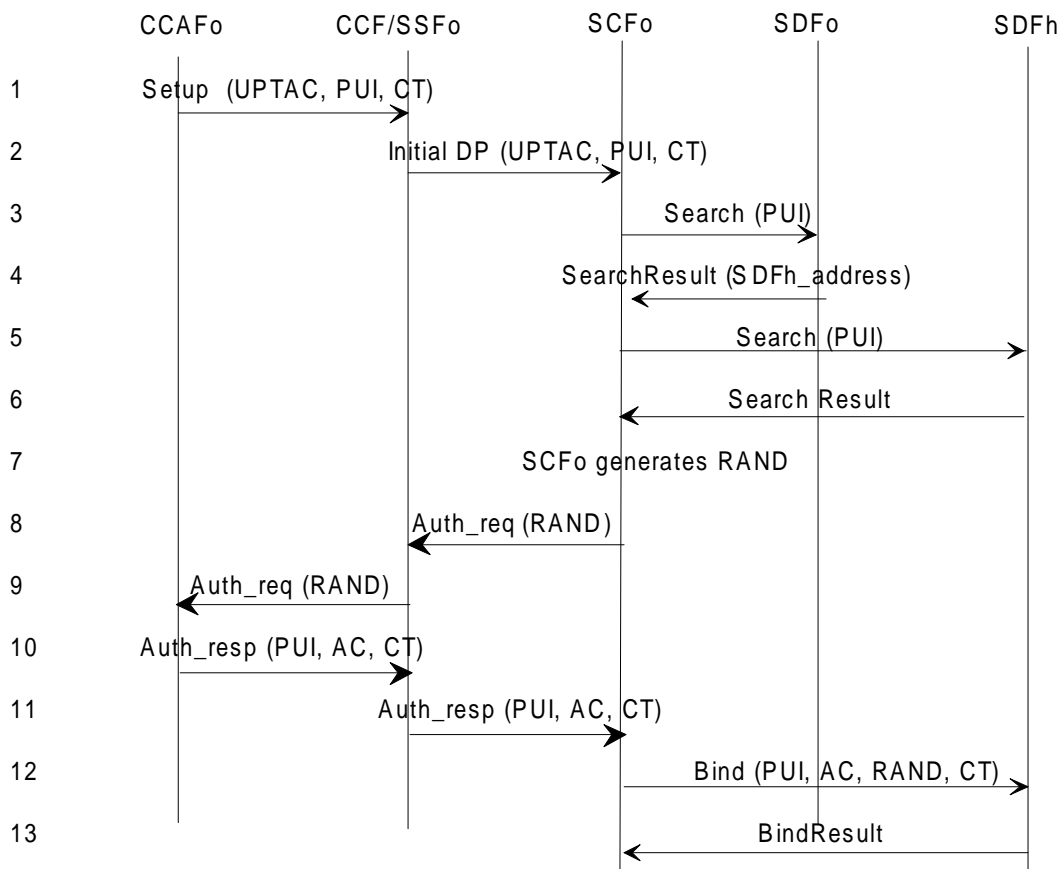
Two-pass strong authentication is described hereafter. Note that two-pass strong authentication is recommended in phase 2 (and mandatory with smart cards). This two-pass strong authentication is as follows:



K : Secret key  
 RAND : Random number  
 AC : Variable Authentication Code

Figure 5.1: Strong authentication scheme

For two-pass strong authentication with the SCF-SDF network interface and without service profile transfer previously performed, we will have the following IFs:



**Figure 5.2: Identification and two pass strong authentication**

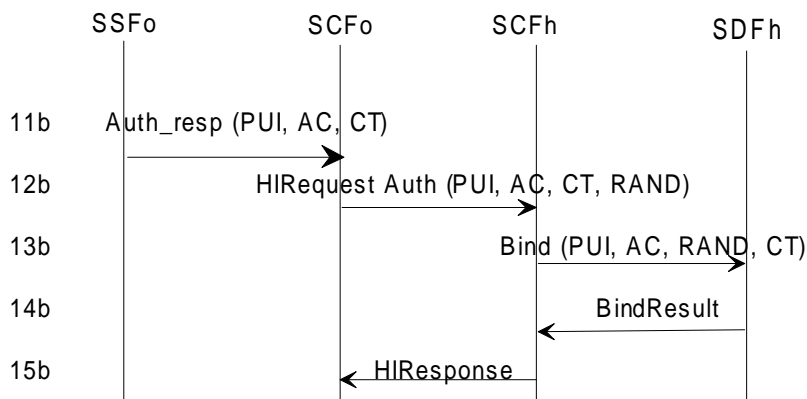
- 1 The CCFo/SSFo receives a set-up message from the CCAFo, containing the UPTAC, the PUI of the user and the CT (Command Type that identifies the algorithm for authentication).
- 2 The CCF/SSFo detects the IN request and sends an Initial DP to the SCFo, with the data received from the access. The SCFo then detects, by the combination of UPTAC and PUI in the initial message (INITIALDP), that the user has to be using a smart card (compare this to UPT phase 1, where detection between manual and automatic authentication was done by \*PUI for automatic or PUI for manual). The request for UPT access indicates that an authentication is required.
- 3, 4 The SCFo performs a local check to verify if there are service agreements with the service provider of the calling UPT user. The SDFh address is retrieved.
- 5, 6 The SCFo queries the SDFh for checks on the use of the PUI (blacklisting...).
- 7 The SCFo generates the challenge RAND. For security reasons, the challenge could be the adding of a time related part and of a random.
- 8, 9 The SCFo sends the random number to the CCF/SSFo and the CCAFo. The CCAFo interacts with the smart card and receives a signed result (AC) calculated by the smart card using the random number and the user's secret key. The secret key is stored in the smart card and only known to the service provider, who holds a list of users and their secret keys.
- 10, 11 The terminal calculates the variable authentication code  $AC=f(RAND, k)$  and sends it back to the SCFo.
- 12, 13 The SCFo asks the SDFh to verify the result. In the mean time the SDFh has also calculated a AC' from the user's secret key and the random number. If the results match, then the authentication is valid.

After this, a feature request can follow.

NOTE 1: A local PIN is used to activate the smart card.

NOTE 2: In case of sets of pre-calculated authentication data stored in the SDFh, the RAND can be received in flow 6 and not generated by the SCFo.

However, we may be able to use the alternative IFs, that assume that service logic assistance from the SCFh is requested by the SCFo:



**Figure 5.3: Identification and two pass strong authentication (service logic assistance)**

### 5.1.2 Call related out-channel procedure case (based on DTMF or DSS1)

The outchannel description of the two pass strong authentication procedure is very similar to the above one. The user inserts his smart card in the terminal and dials the UPTAC.

The only differences are the carrying of authentication data in the D-channel instead of B-channel. This procedure makes use of CS2 Out Channel Signalling capabilities.

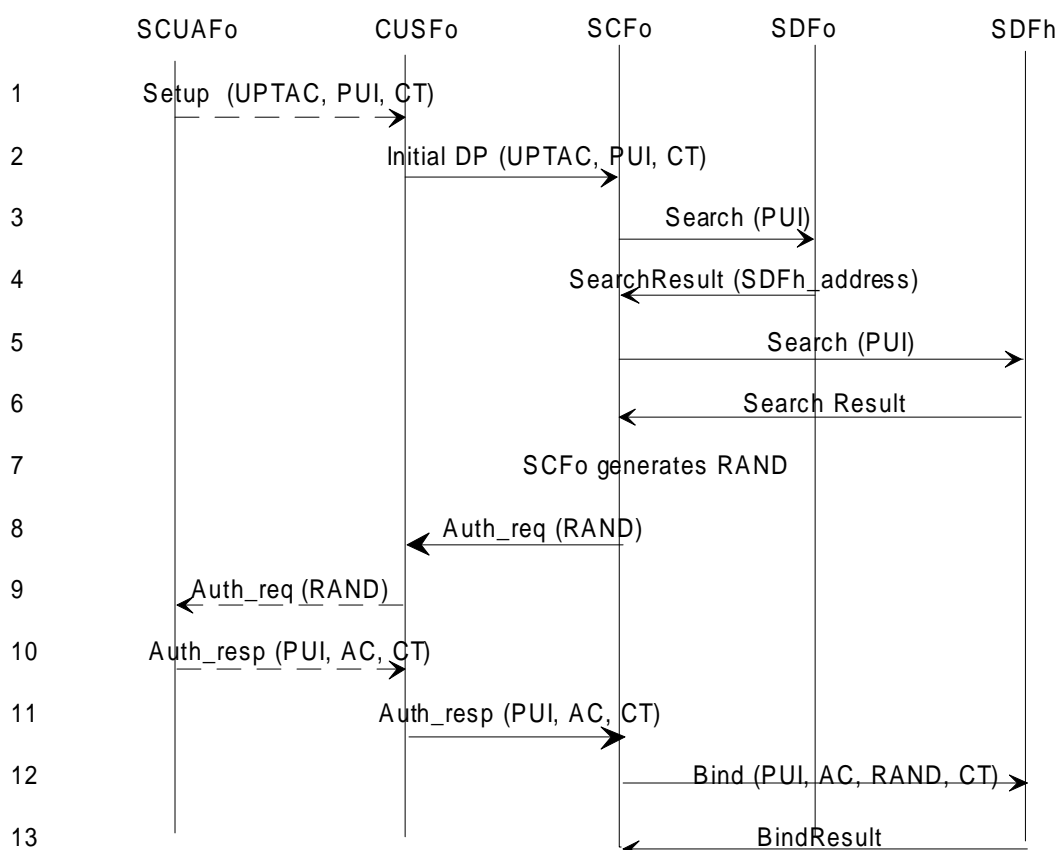
NOTE: The SCF-SSF flows have a provisional name in the OCCRUI procedure.

### 5.1.3 Call unrelated procedure case

In that case, the description of the procedure is quite similar to the call related one, except that the call unrelated entities (SCUAF and CUSF) replace the call related ones (CCAF and SSF). The interactions between the smart card and the network are call unrelated.

Here, the access to UPT could be done by call using unrelated messages (signalling sequences as for the short messages used in GSM), e.g. the user dials on the keypad to interact with the UPT network

The call unrelated authentication procedure can be used as an option before any UPT feature request is done (outgoing call, registration, service profile management).



**Figure 5.4: identification and two pass strong authentication (call unrelated)**

- 1 The CUSFo receives a set-up message from the SCUAFo, containing the UPTAC, the PUI of the user and the CT (Command Type that identifies the algorithm for authentication).
- 2 The CUSFo detects the IN request and sends an Initial DP to the SCFo, with the data received from the access. The SCFo then detects, by the combination of UPTAC and PUI in the initial message (INITIALDP), that the user has to be using a smart card. (Compare this to UPT phase 1, where detection between manual and automatic authentication was done by \*PUI for automatic or PUI for manual). The request for UPT access indicates that an authentication is required.
- 3, 4 The SCFo performs a local check to verify if there are service agreements with the service provider of the calling UPT user. The SDFh address is retrieved.
- 5, 6 The SCFo queries the SDFh for checks on the use of the PUI (blacklisting...).
- 7 The SCFo generates the challenge RAND. For security reasons, the challenge could be the adding of a time related part and of a random.
- 8, 9 The SCFo sends the random number to the CUSFo and the SCUAFo. The SCUAFo interacts with the smart card and receives a signed result (AC) calculated by the smart card using the random number and the user's secret key. The secret key is hidden in the smart card and only known to the service provider, who holds a list of users and their secret keys.
- 10, 11 The terminal calculates the variable authentication code  $AC=f(RAND, k)$  and sends it back to the SCFo.
- 12, 13 The SCFo asks the SDFh to verify the result. In the mean time the SDFh has also calculated an AC from the user's secret key and the random number. If the results match, then the authentication is valid.

After this, a feature should follow.

NOTE: In case of sets of pre-calculated authentication data stored in the SDFh, the RAND can be received in flow 6 and not generated by the SCFo.

## 5.2 Incoming call

### 5.2.1 Incoming Call with described service assistance

The following assumptions are made with respect to the Incoming Call procedure:

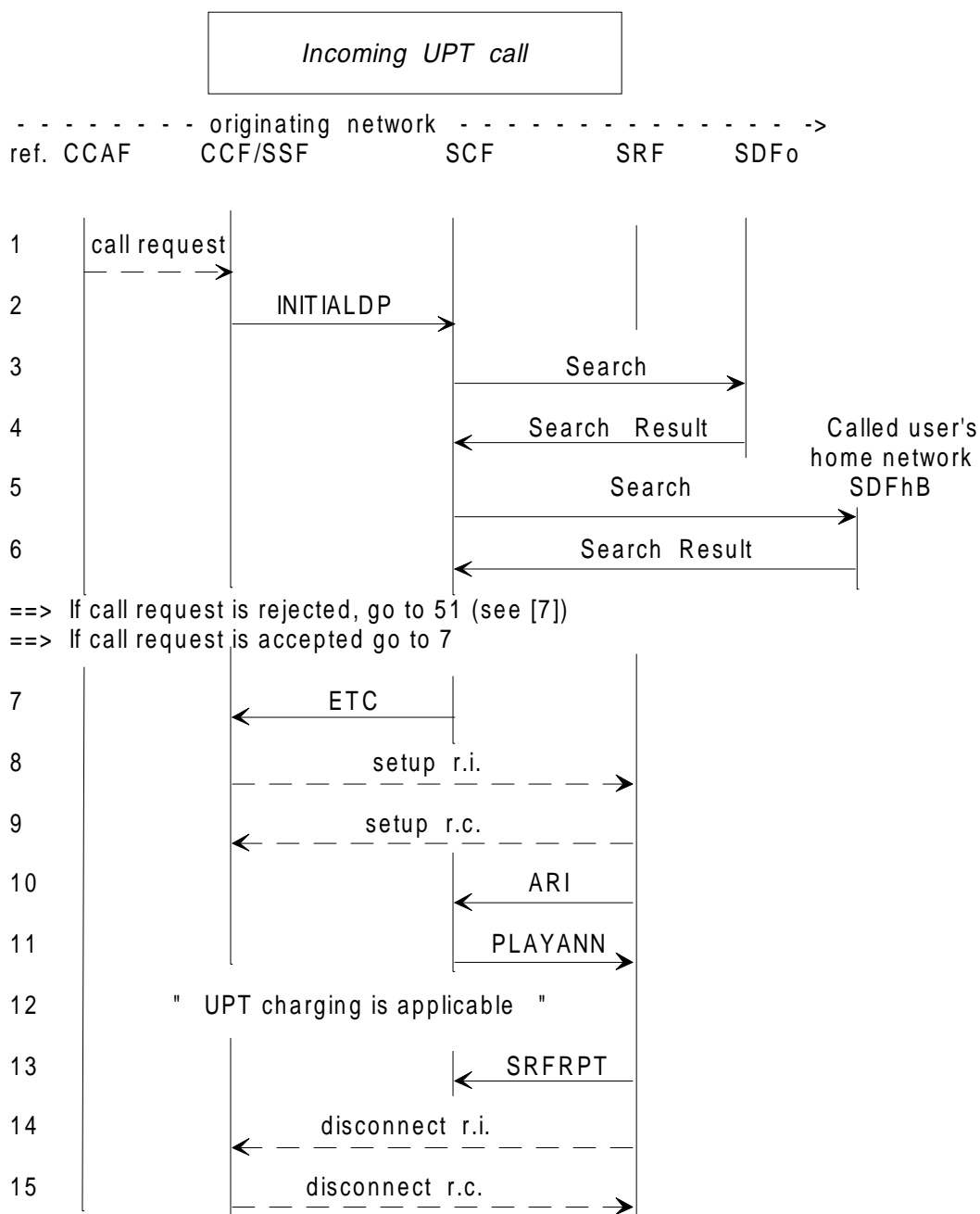
- the UPT user's home network can be derived from the data the UPT user provides the visited network, as well as the service provider and home database. This information is embedded in the parameter PUI;
- if several UPT users are registered on the same terminal, a possibility to differentiate them before answering is to use special rings or announcements.

For Incoming UPT Call, the phase 1 information flows can apply.

#### When service assistance is needed:

in some cases, the SCF-SCF interface is needed between networks when the controlling SCFo requests assistance from the SCFh. For example, see scenario 3 in Secure Answering descriptions below.

Another need for SCF-SCF use is the offering of specific services, beyond the standardized description. In that case, two new flows could be added to the phase 1 description: see the enhancement in the flows 5 and 6 in the figure 5.5 (the figure presents the first part of the detailed flows of UPT phase 1 IFs for incoming call, that has to be enhanced. See TCR-TR 040 [4]):



**Figure 5.5: Incoming call (beginning of description)**

- 1, 2    A received UPT number sequence triggers "Initial Detection Point".
- 3, 4    The SDFo is queried to check if there exists particular agreements between the local service provider and the called user's home provider for establishing incoming calls.
- 5, 6    The SDFhB query is made to retrieve the location of the called user and the charging reference point. Particular restrictions may also be checked in SDFhB when necessary.

In addition, for service logic assistance, the SCFo queries the SDFh in order to know if specific services will need service logic assistance. The response to the query to the SDFh could be made of a mark in the profile, of the SCFh address/identity and of criterias for which this SCFh should be called (corresponding to specific services). The mark indicates that assistance may be needed and that the stored criterias should be looked at. These criterias could be, e.g. specific digit strings, prefixes or access codes, bearer capability, DPs, causes (un/conditional on specific patterns), etc. This needs further study.

- 7, 12 After a connection to SRF the calling user is informed on particular charging conditions that may apply.
- 13 SRF reports when the announcement is played through.
- 14, 15 Disconnection is initiated from SRF.

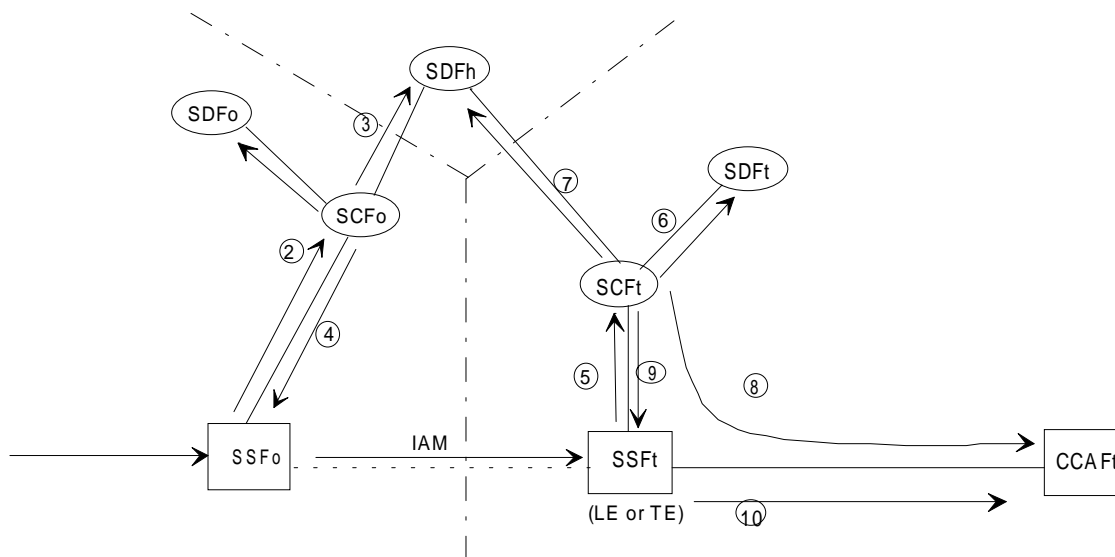
## 5.2.2 Alternative Incoming call, with triggers on originating and terminating sides

When considering the way operators/networks are involved in a UPT incoming call, the most concerned by authentication and service profile check is the terminating network since the user is roaming in the terminating network. Consequently, a possible high level is described below:

to trigger SCFt also on the terminating side:

- SCFo is first triggered on the originating side (SSFo) in order to get a routing address; then it can release its dialog or not (some services could be provided as part of call origination based on the service profile accessed by SCFo, e.g. as Call Forwarding Unconditional);
- when the call arrives on the terminating side, the SCFt is triggered on the terminating side (SSFt) in order to check the service profile and be ready to offer "terminating" services if needed (Call Pick-Up, Hold, CW...). The SCFt does not release the dialog.

Figure 5.6 presents a general description of the UPT IC with double trigger:



**Figure 5.6: Double trigger for incoming calls**

The numbers correspond to:

- 1) set-up to the SSFo;
- 2) the SSFo triggers the SCFo thanks to the called party number, the UPTN;
- 3) after having checked the agreements in the SDFo, the SCFo retrieves from the SDFh in the home network some routing information;
- 4) with this information, the call is routed to the terminating network and the SSFt;
- 5) the SSFt triggers the SCFt;
- 6) as an optional step, the SCFt retrieves some precise information on the location of the called UPT user. This depends on the terminating network operator and the kind of data stored in the SDFh at the registration time;

- 7) the SCFt checks the service profile in the SDFt if the service profile was copied at registration, else in the SDFh. This could be done again later as well, for example only if authentication (secure answering) is performed or because of a new event (e.g. CW, Call Waiting);
- 8) if secure answering has to be performed (from the terminating side), the SCFt performs the procedure through call related (or unrelated entities, under study);
- 9) the SCFt orders the SSFt to route the call towards the precise location;
- 10) the call is routed.

Releasing the connection from the SCFo may occur some non optimization in call routing in case of CF, for example (see also the new IFs 61 to 66).

Then, mainly based on the phase 1 IFs, a possible description is as follows:

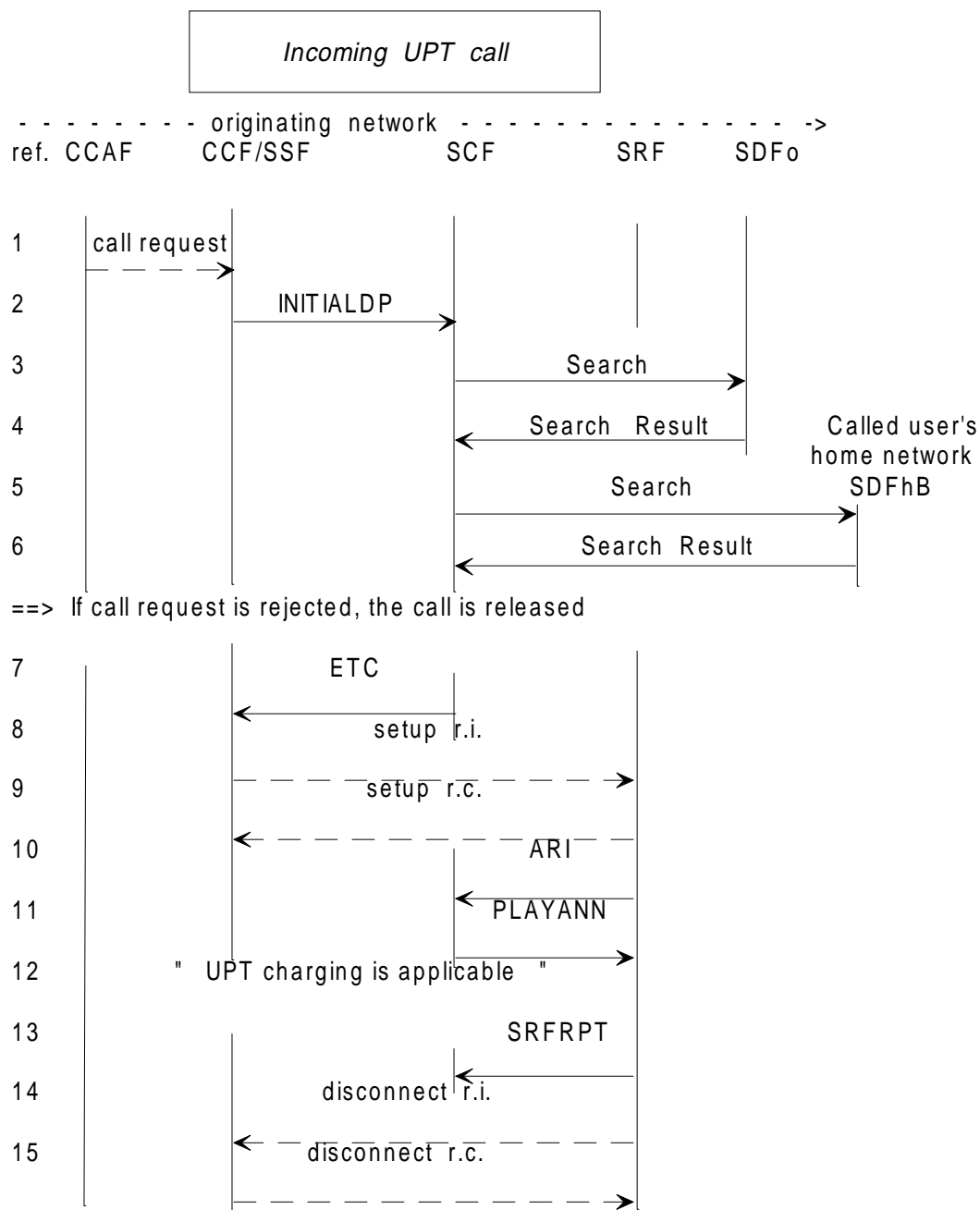
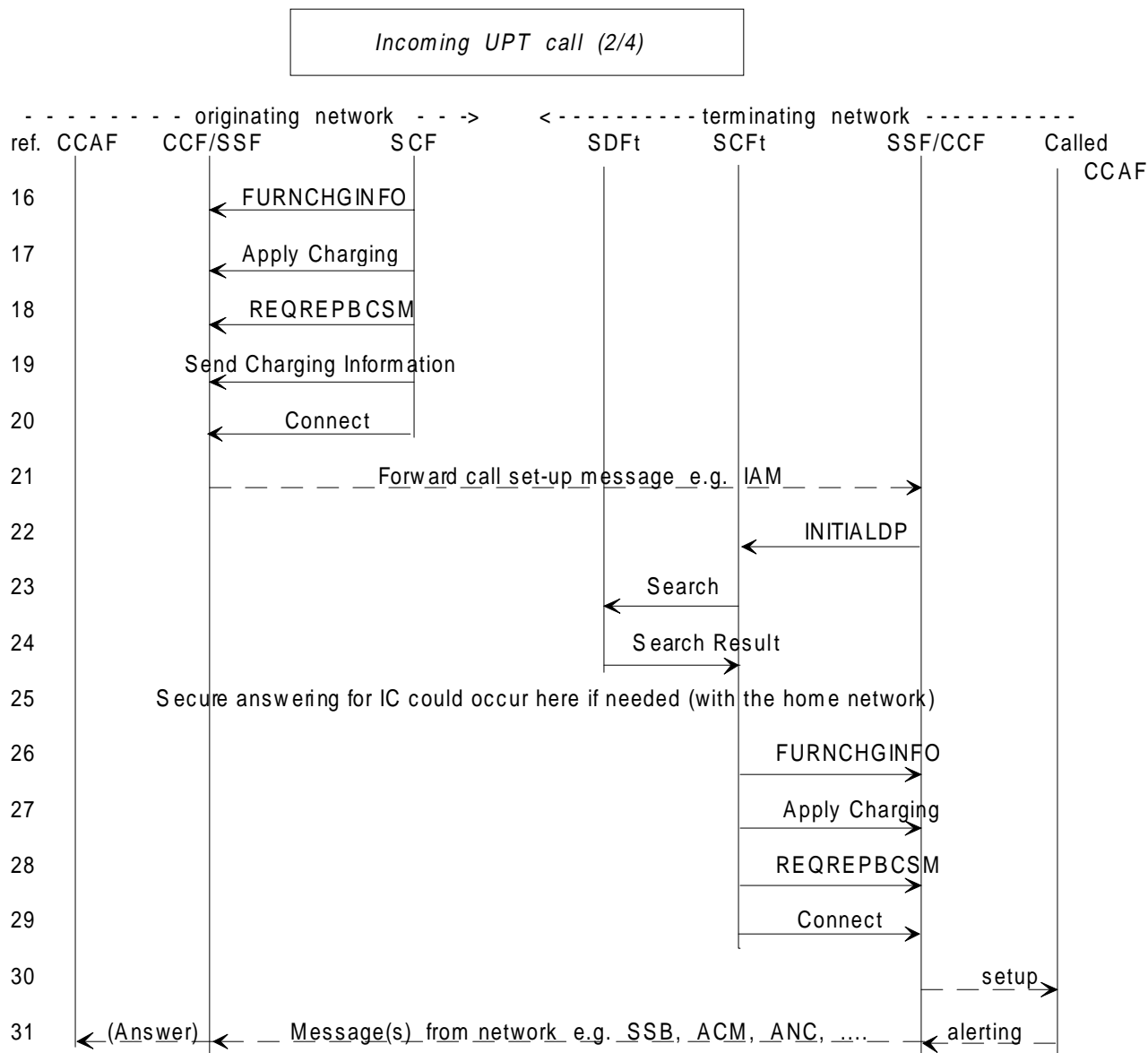


Figure 5.7 (sheet 1 of 4): alternative incoming call





==> On busy, congestion or no answer go to 51 or 61, depending where the feature has to be processed (originating or terminating side)  
 ==> When call set-up is successful:

C O N V E R S A T I O N

The calling user hangs up first: go to 41  
 The called user hangs up first: go to *UPT B-party initiated release*

**Figure 5.7 (sheet 2 of 4): Alternative incoming call**





14-15 Disconnection is initiated from SRF.

Several SRF connection scenarios are possible.

Flows 16 to 19 are optional since the controlling SCF is the SCFt.

16 The "FurnishChargingInformation" operation is sent to instruct SSF to create a call record for the following call event.

NOTE 1: FurnishChargingInformation is used if call record is generated at SSF.

"Apply Charging" may be used if the call record is generated at SCF.

17 "Apply Charging" may be necessary also to send charging information back to the SCF.

18 SCF can order SSF to suspend call processing at given detection points.

19 "SendChargingInformation" may be necessary also to send metering pulses to the calling line.

20 SCF orders SSF to set up the call. Also, the SCFo can release its connection to the SSFo or orders the SSF to suspend call processing at some DPs (described in flow 18).

21 A call attempt is made towards the destination network.

22 A sequence triggers "Initial Detection Point".

23-24 The SDFt query is made to retrieve the location of the called user and the charging reference point for the terminating network. It also enables a local check for agreement between terminating and home networks.

Particular restrictions may also be checked in SDFhB when necessary.

25 Secure answering with the home network could occur at that point.

26 The "FurnishChargingInformation" operation is sent to instruct SSFt to create a call record for the following call event.

NOTE 2: FurnishChargingInformation is used if call record is generated at SSFt.

"Apply Charging" may be used if the call record is generated at SCFt.

27 "Apply Charging" may be necessary also to send charging information back to the SCFt.

28 SCFt can order SSFt to suspend call processing at given detection points.

29 SCFt orders SSFt to set up the call.

30 In the destination network a call attempt is made towards the user.

31 The result is received in the controlling SSFt.

If the called user answers, this is received in SSFt and sent backwards.

41 The call is terminated by the A-party.

42-43 The forward and backward connections are released and an appropriate signal is sent backwards.

Flows 44-46 are optional (see above for 16 to 19)

44-46 When an "APPLYCHGRPT" is pending the record generated in the SSF/CCF is returned to the SCF and transferred to the SDFhB.

Another record may also be sent to the originating network.

47-49 When an "APPLYCHGRPT" is pending the record generated in the SSFt/CCFt is returned to the SCFt and transferred to the SDFhB.

Another record may also be sent to the originating network.

- 51 When the call is unsuccessful the controlling SCFo is informed.
- 52-53 If a busy or no answer indication is received, a request is made to the B-user's home data base to check whether the call forwarding service is activated.  
If call forwarding is activated, the redirection address is retrieved and a new call attempt is made.
- 54-56 In the case of a rejected or unsuccessful call attempt, SSFo releases the connections in both directions with an appropriate signaling sequence (Network dependent).  
(In the case of a rejected call attempt, SCFo orders the release.)
- 61 When the call is unsuccessful the controlling SCFt is informed.
- 62-63 If a busy or no answer indication is received, a request is made to the B-user's home data base to check whether the call forwarding service is activated.  
If call forwarding is activated, the redirection address is retrieved and a new call attempt is made.
- 64-66 In the case of a rejected or unsuccessful call attempt SSFt releases the connections in both directions with an appropriate signaling sequence (Network dependent).  
(In the case of a rejected call attempt, SCFt orders the release.)

***NOTE 3:** The impact of this alternative description on Incall registration is that the visited SDF is updated with the terminal address used for registration, and the SDFh is updated with a routing address provided by the visited network (e.g. visited SSF or CUSF address).*

### 5.3 Secure Answering for Incoming UPT Calls

The way Secure Answering may be performed depends on how call and connection control is carried out. It is necessary that some form of inter operator agreements exist to prevent networks from initiating concurrent/parallel authentication procedures.

Particularly in the case of UPT to UPT calls, several IN networks might be involved.

It is generally assumed that the originating network is the "first" IN network with UPT service facility encountered in the progress of the call set-up.

It is also assumed that the Secure Answering request is registered in the called UPT user's service profile.

Whether the A-user is also connected to an SRF to receive a waiting prompt needs further clarification.

For this procedure, a number of assumptions can be considered: service profile transfer previously made, capability or not of the SCFo to process the procedure, identity of the network controlling the procedure...

Hereafter are proposed flows only in the case when no data transfer was made between SDFo and SDFh, when the SCFo processes the secure answering and when authentication is performed by the home network. They are described with weak authentication, but authentication could also be strong.

**NOTE:** All three scenarios make use of inband signalling procedures which does not allow smart-card based authentication for secure answering.

#### General description:

Upon B-answer an authentication procedure is initiated and monitored from the SCFo. The B-user is connected to the SRFo (scenario 1 to 3). User input authentication data is collected in the SCFo.

The SCFo then handles the authentication with the B user's home network.

### 5.3.1 Scenario 1

The SCFo has the capabilities to process secure answering on its own (*in-band*)

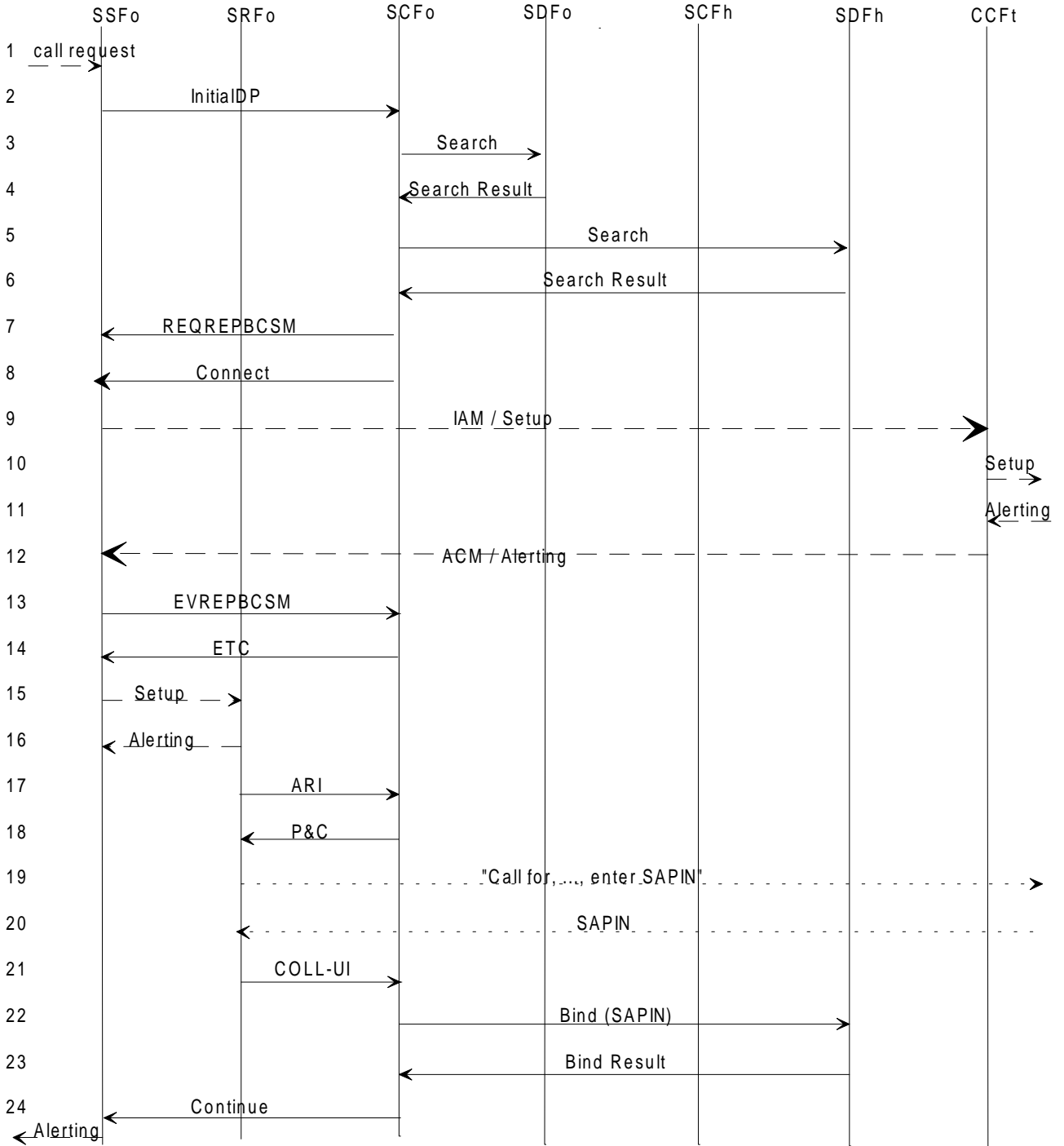


Figure 5.8: Secure answering (in-band, by SCFo)

### 5.3.2 Scenario 2

The SCFo has the capabilities to process secure answering on its own (*out-channel*) which is a variant from the previous scenario.

Consequently, Out Channel User Interactions are proposed in this scenario.

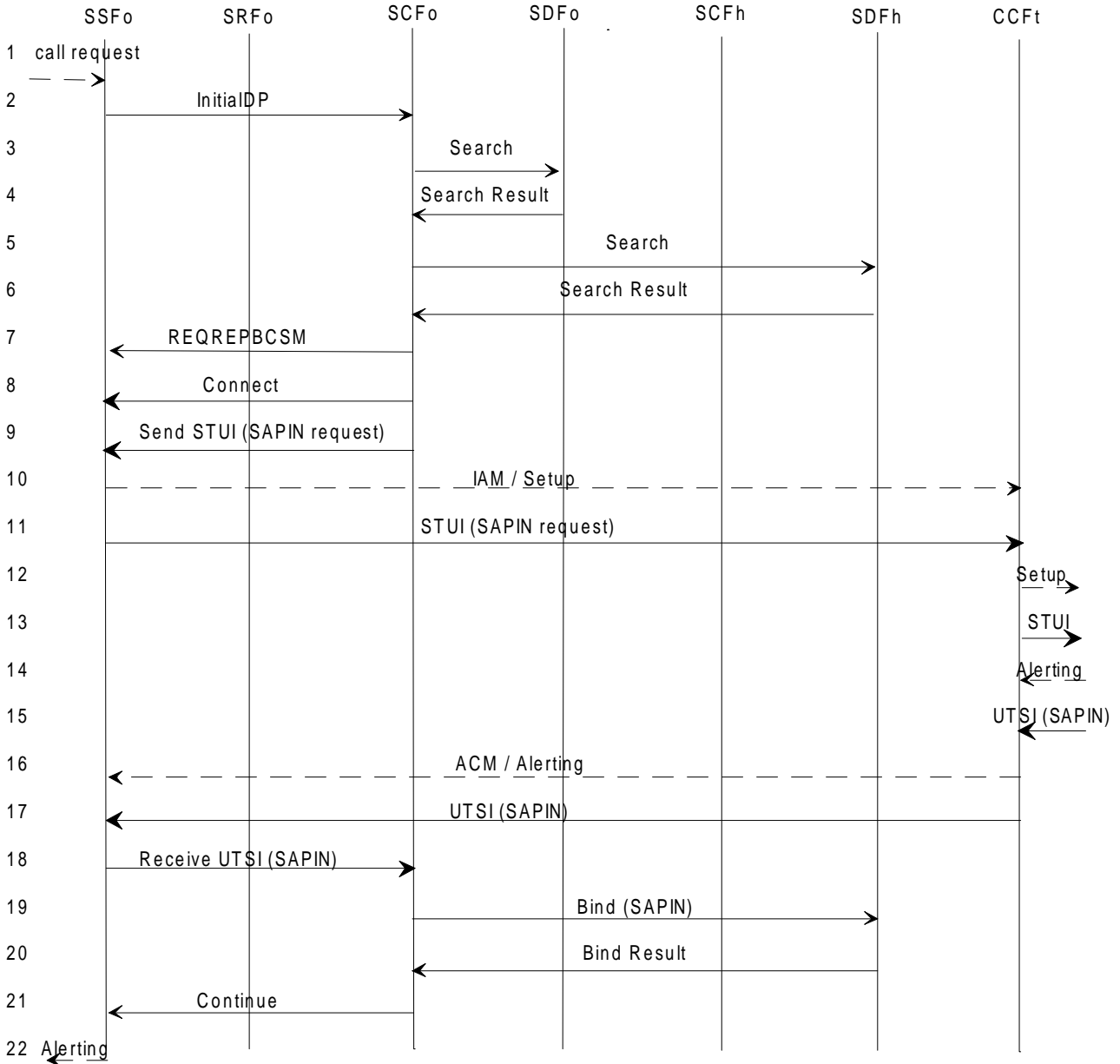


Figure 5.9: Secure answering (out-channel, by SCFo)

### 5.3.3 Scenario 3

In this case, the terminating network is involved and the SCFo has to request service logic assistance from the SCFt. Collected input data (SAPIN code) is sent back to the SCFo over the SCF-SCF interface.

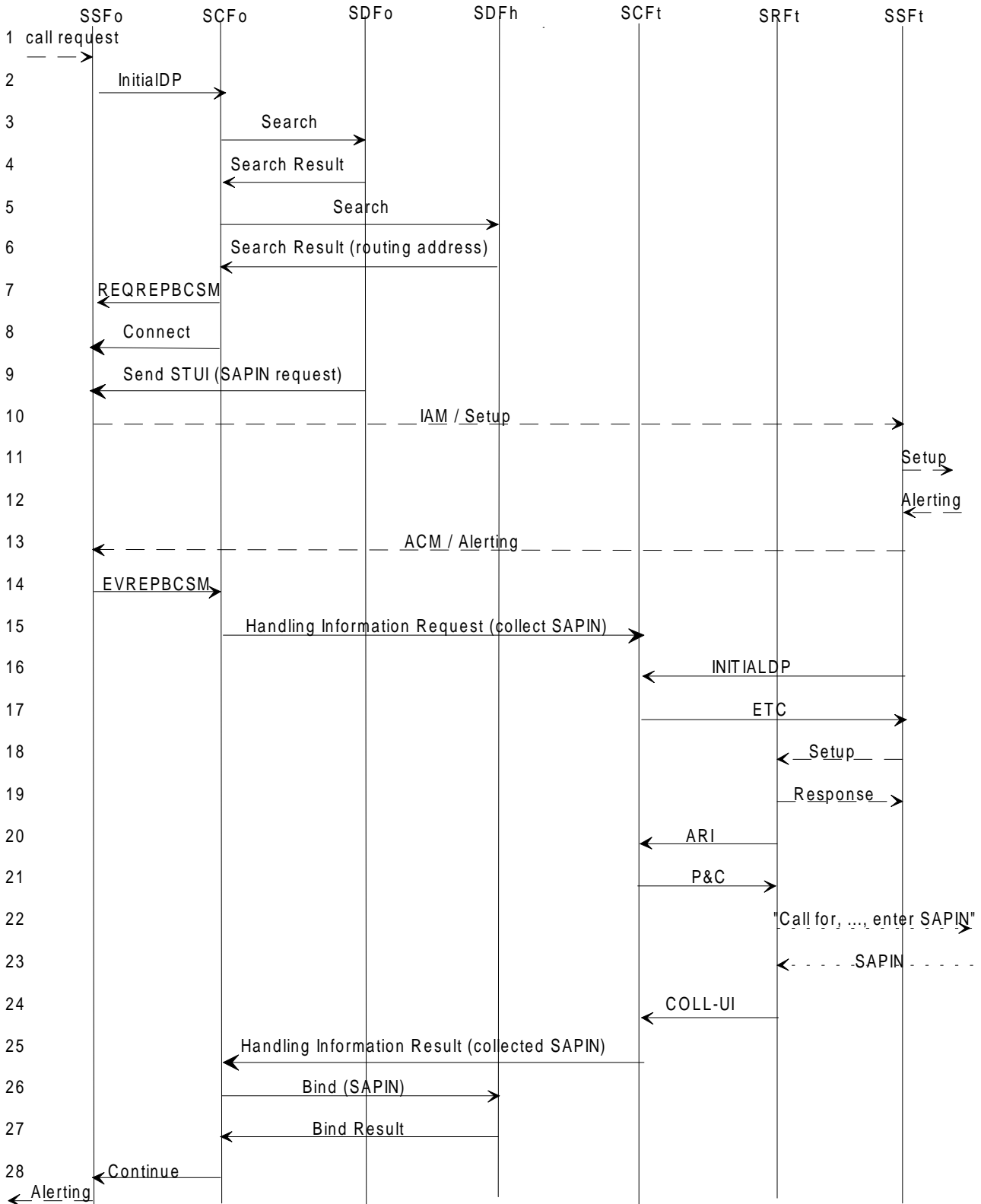


Figure 5.10: Secure answering (SCFt involved)



In this third description, the triggering criteria in flows 16/17 needs further study (it occurs after the flow 12, possibly in the same time as the flows 13 to 15).

This scenario requires also that a correlation is made in the SCFt between the "Handling Information Request" received from the SCFo and the "INITIALDP" triggered in the SSFt when the called user answers (between flows 15 and 16).

## 5.4 Registration/Deregistration for Outgoing Calls

The processing of outgoing UPT call registration is very similar to the incoming UPT call registration one. The main differences depend on the way the calling UPT user will access the UPT service when doing an outgoing call (after being registered); the three solutions are summarized below:

- a) the line at which the user is registered is temporary marked,
- b) the UPT user dials a specific UPT access code to indicate that the Outgoing UPT call when registered procedure has to be activated,
- c) the UPT user dials the UPT access code (UPTAC) and the network understands that the outgoing call procedure has to be activated, by doing a preliminary check in the SDFo.

These three solutions are from the visited network responsibility.

Two network scenarios might be considered for registration:

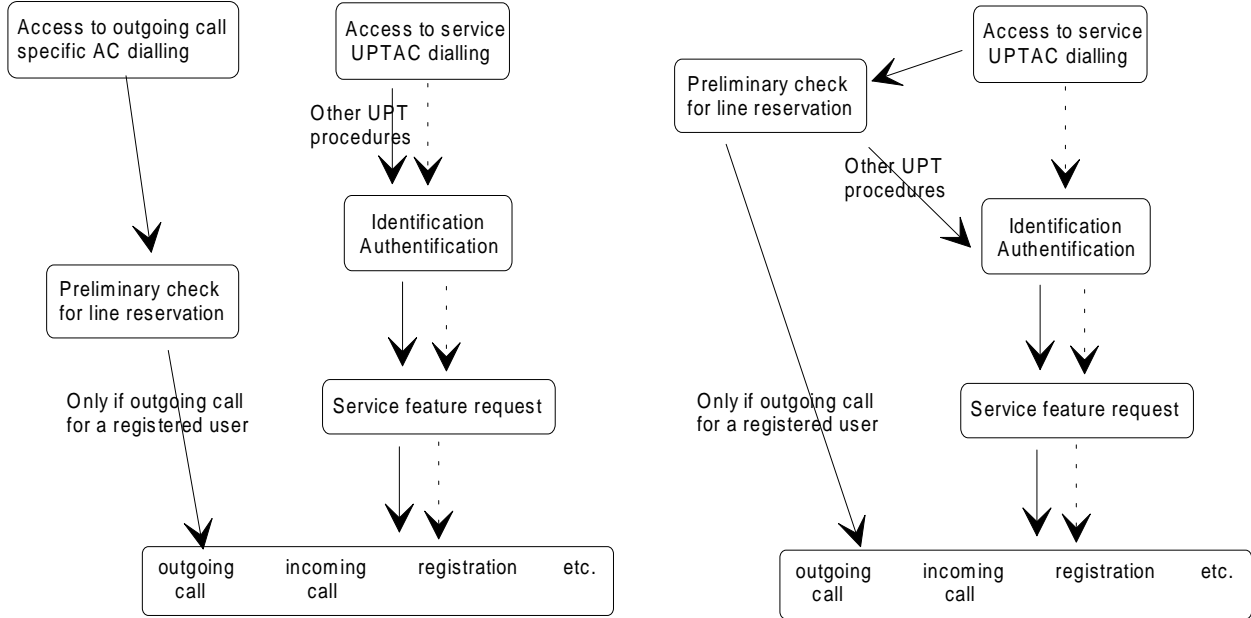
- 1) the line at which the user is registered is connected to the UPT serving node/exchange,
- 2) the line at which the user is registered is connected to is not an IN node or is an IN node with no UPT service facility.

	scenario 1	scenario 2
<b>a) line temporary marked</b>	<ul style="list-style-type: none"> <li>- Off line network procedures to mark the line (Temporary UPT Registration Active)</li> <li>- Use of the CS-2 Origination_Attempt DP</li> <li>- DP temporary arming/disarming may be either done by:               <ul style="list-style-type: none"> <li>- SCF with CS-2 operation Activate/Deactivate Trigger Data</li> <li>- SMF using the existing administrative procedures for static DP arming (pseudo real-time). Not standardized</li> </ul> </li> </ul>	Not supported by CS2 because the SSF in not in the LE here
<b>b) specific access code</b>	<ul style="list-style-type: none"> <li>- the IN node handles the request as a part of the UPT service (no impact on the BCSM)</li> <li>- definition of a new access code</li> </ul>	<ul style="list-style-type: none"> <li>- no other impact on the local exchange than a conventional routing issue</li> <li>- the IN node handles the request as a part of the UPT service (no impact on the BCSM)</li> <li>- definition of a new access code</li> </ul>
<b>c) UPTAC</b>	<ul style="list-style-type: none"> <li>- as in 1) b)</li> <li>- CLI has to be available in SDFo</li> </ul>	<ul style="list-style-type: none"> <li>- as in 1) b)</li> <li>- CLI has to be available in SDFo</li> </ul>

Depending the chosen scenario for processing outgoing call after registration, IFs for outgoing UPT call registration will be slightly different (see the notes on flows 34-39 for registration and 17-22 for deregistration).

### 5.4.1 Impact of the outgoing call scenarios on general UPT procedures

The two scenarios b) and c) imply some modifications in the usual way to process UPT procedures. These modifications are illustrated below: dotted lines correspond to the SS1/CS1 description (stage 2 and stage 3), continuous lines correspond to the ways UPT procedures have to be done if b) and c) are used for outgoing UPT calls without authentication (note that the retrieval of the user identity is not illustrated below).



When b) used by registered users

When c) used by registered users

The two scenarios b) and c) imply some modifications in the usual way (as for SS1 on CS1) to process UPT procedures.

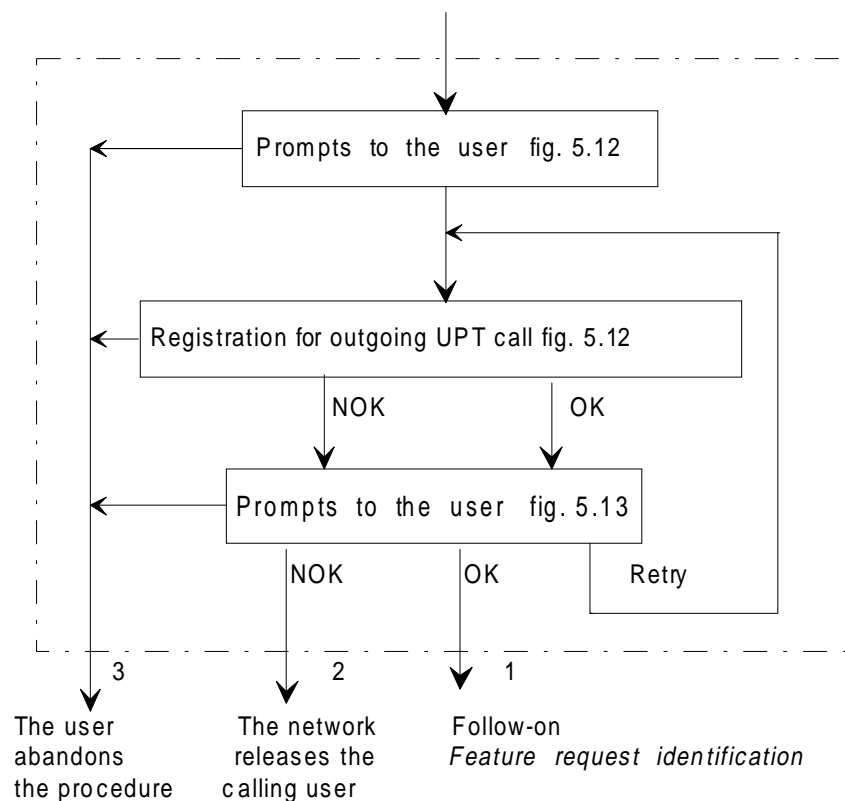
*The preferred scenario is the scenario a), it is described below (and scenario c) is in Annex A).*

## 5.4.2 Registration for outgoing calls (solution a)

Prerequisite sequences: Access, identification and authentication

Feature request identification

The organization of the registration sequence is given in the block diagram of figure 5.11.



**Figure 5.11: Registration for outgoing calls**

As an option, the procedure includes the possibility for the user to impose limitations/restrictions to the registration.

Prompts are given to the user according to allowed service options.

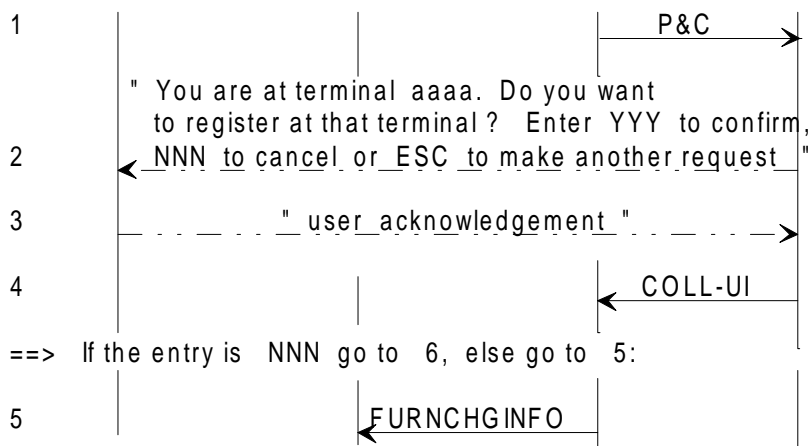
The logical outputs of the procedure are:

- 1) OK: the user is allowed to request another feature (follow-on);
- 2) NOK: the user is released by the network after a prompt (to prevent the service/network from being misused, e.g. abnormal number of retries after a request rejection, the network may release the user. This function is carried out in the SCF);
- 3) the user abandons the request (in any state).

*Prompts and registration for outgoing UPT call*

----- originating network ----->  
 ref. CCAF                      CCF/SSF                      SCF                      SRF

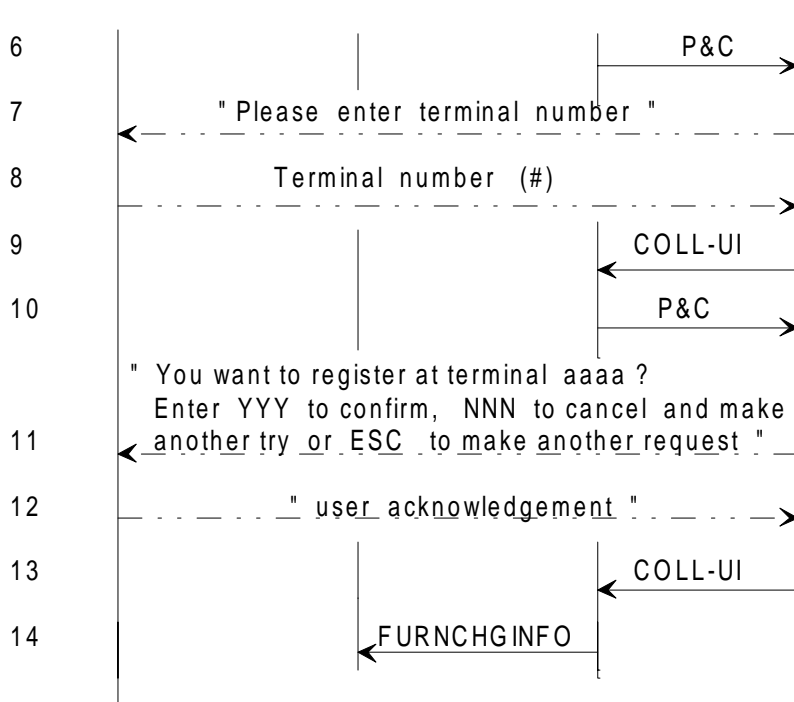
1) In a network with automatic Calling Line Identification:



==> If the entry is NNN go to 6, else go to 5:

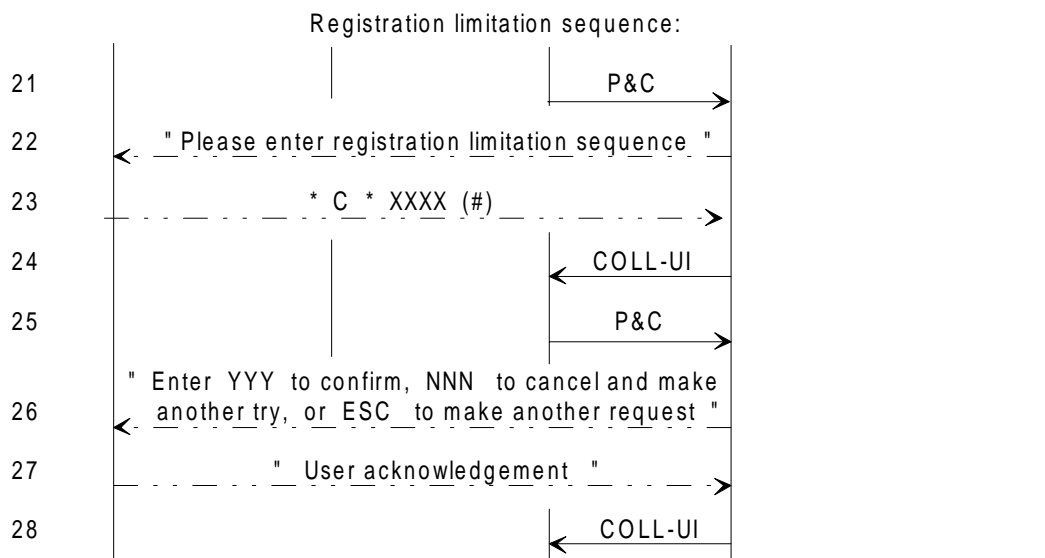
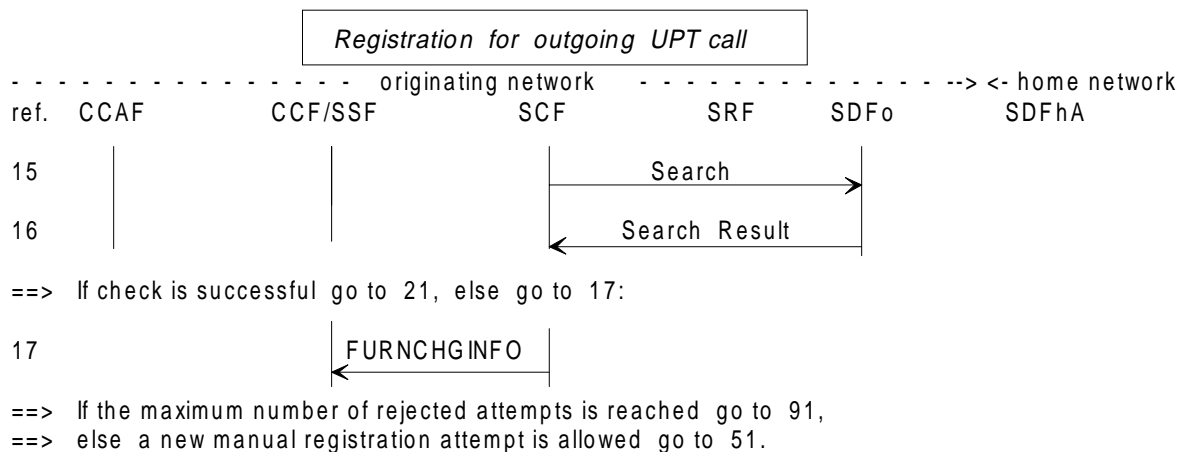
==> If the entry is YYY go to 15, if the entry is ESC go to 61.  
 ==> If the maximum number of cancelled attempts is reached go to 91.

2) In a network with no Calling Line Identification:

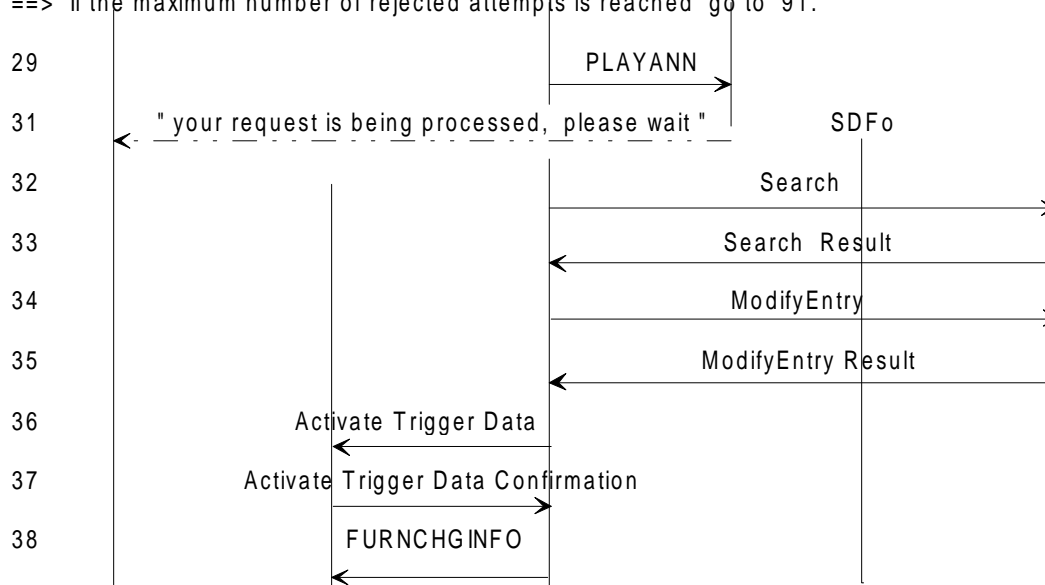


==> If the entry is YYY go to 15,  
 ==> If the entry is NNN go to 71,  
 ==> If the entry is ESC go to 61,  
 ==> If the maximum number of cancelled attempts is reached go to 91.

**Figure 5.12 (sheet 1 of 2): Prompts and registration for outgoing calls**



==> If the entry is YYY go to 29,  
 ==> If the entry is NNN go to 81,  
 ==> If the entry is ESC go to 61,  
 ==> If the maximum number of rejected attempts is reached go to 91.



==> If registration is successful go to 41  
 ==> If the maximum number of rejected attempts is reached go to 91,  
 ==> else go to 101

**Figure 5.12 (sheet 2 of 2): Prompts and registration for outgoing calls**

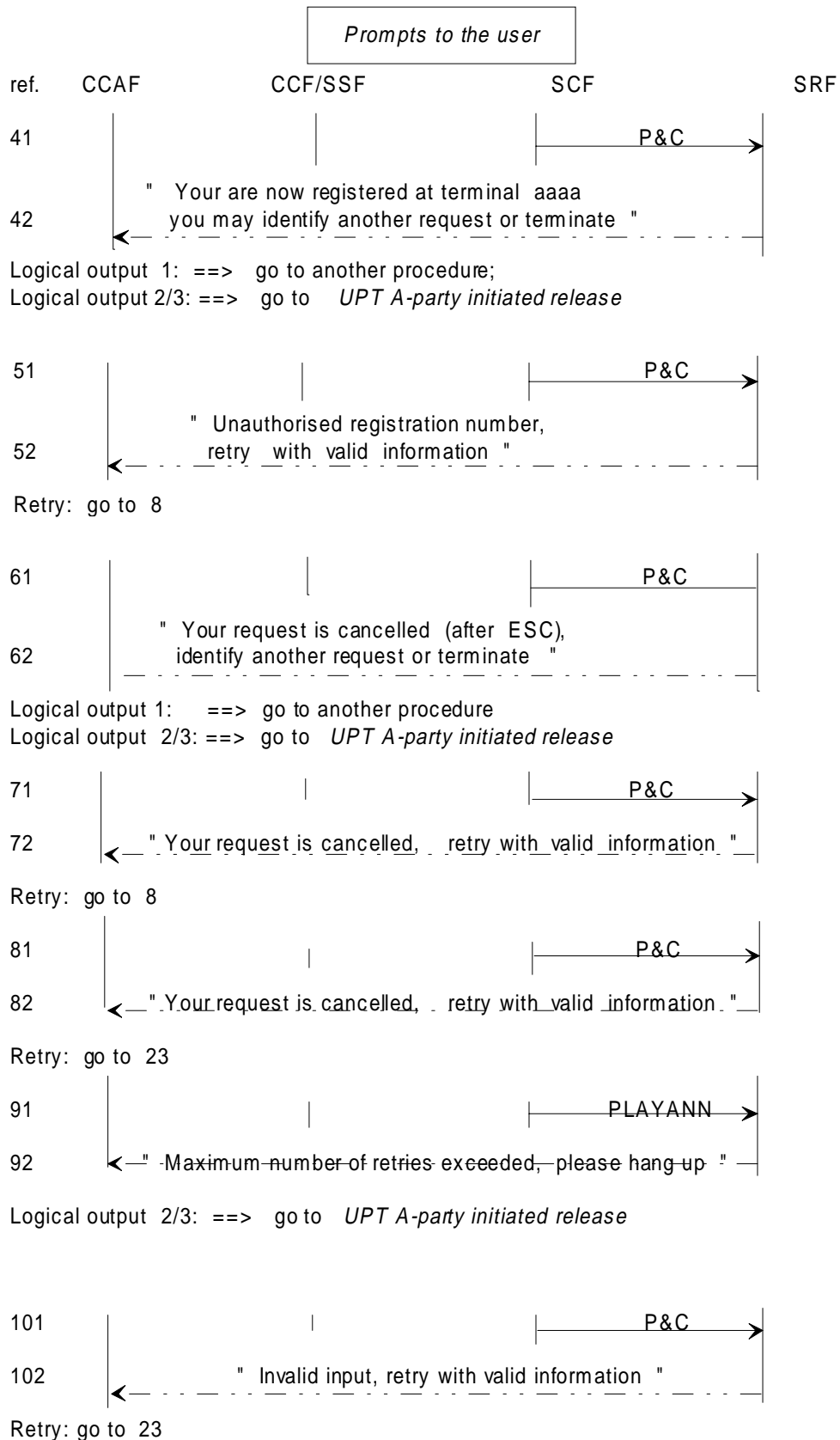


Figure 5.13: Prompts to the user

Notes on *registration for outgoing UPT calls*

IF ref.:

- 1-5 When CLI is available in the network the user has to first confirm whether registration will be at that terminal or not. If "yes", or in case of Escape, the "FurnishChargingInformation" is sent to instruct SSF to update the record. If "no" the procedure is the same as when no CLI is provided.
- 6-9 The user is prompted to enter terminal number. This can be given in different ways, depending on network capabilities. For example, a subscriber number in national or E.164 for international number.
- Usually a country code and a subscriber number are required (only the country code of the home country or of the visited country are allowed).
- A flag (#) may be used to indicate end of terminal identity.
- 10-13 The given terminal number is echoed and the user is requested to confirm (or reject). The SRF sends the response to the SCF.
- According to user input, terminal identification may be repeated or abandoned.
- 14 The "FurnishChargingInformation" is sent to instruct SSF to update the record.
- 15-16 The SDFo is queried to check if any restrictions apply to the use of the given terminal number.
- If the registration is denied a negative reply is sent to the SCF.
- 17 See 14.
- 21-22 The user is offered to enter a sequence of information to limit/restrict the registration.
- 23-28 The sequence contains a code (C) which indicates the nature of the limitation e.g. period of time, date, default limitation stored in the service profile or no limitation. The necessary parameters are given in a following block (XXXX). A separator \* is dialed between the two blocks.
- The sequence is echoed to the user for confirmation.
- According to the user input, the limitation sequence may be repeated (sequence (71,72 and 23-28) or abandoned (ESC)).
- NOTE: The originating network makes only a format check on the received sequence.
- 29-35 The SDFhA is queried to check if the given terminal number does not violate any restriction and is updated with the new location. If the registration is denied, a negative reply is sent to the SCF. A waiting prompt is given to the user. The service profile is updated with the location data given by the UPT user.
- 36-37 The SCF requests the SSF/CCF to change the value of activation/deactivation control field to active value (see ITU-T Recommendation Q.1224 [3]). It sends the callID, the Trigger Data Identifier and, optionally, the Registrator Identifier (e.g. PUI).
- 38 See 14.
- 41-42 When registration is completed successfully, the user may want another UPT feature. For this purpose the user may identify another feature request (follow-on).
- 51-52 The SRF prompts the user that registration was rejected, another valid terminal identity could be input again.
- 61-62 When the user cancels the request, another feature request may be input (follow-on).
- 71-72 After a negative acknowledgement, the SRF prompts the user that terminal number could be input again.
- 81-82 After a negative acknowledgement, the SRF prompts the user that limitation sequence could be input again.
- 91-92 The SRF prompts the user that the maximum number of rejected requests is reached. The count of the number of attempts is done in the SCF. The user is asked to hang up.

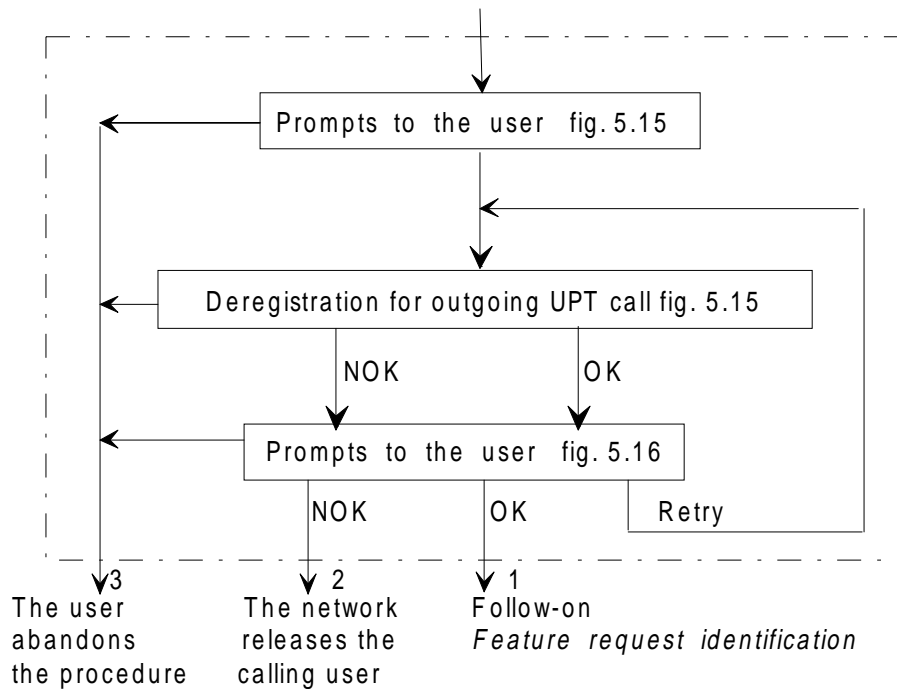
101-102 The SRF prompts the user that registration was rejected, another valid terminal identity could be input again.

### 5.4.3 Deregistration for outgoing calls (solution a)

Prerequisite sequences: Access, identification and authentication

Feature request identification

The organization of the deregistration sequence is given in the block diagram of figure 5.14.



**Figure 5.14: Deregistration for outgoing calls**

Prompts are given to the user according to allowed service options.

The logical outputs of the procedure are:

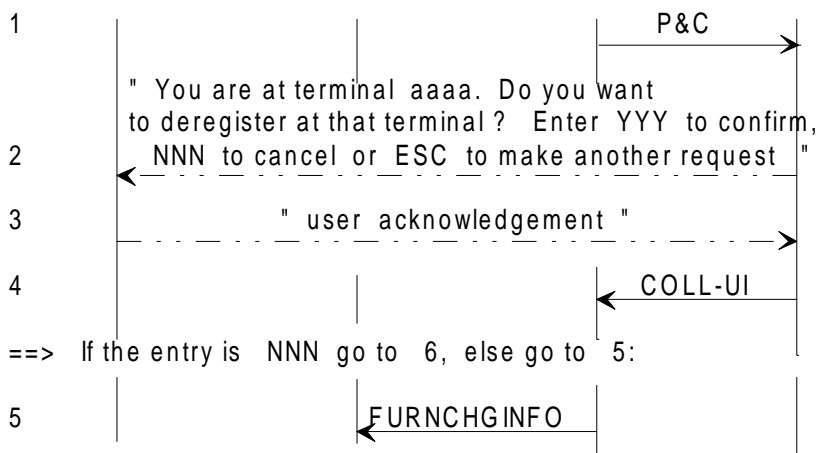
- 1) OK: the user is allowed to request another feature (follow-on);
- 2) NOK: the user is released by the network after a prompt (to prevent the service/network from being misused, e.g. abnormal number of retries after a request rejection, the network may release the user.). This function is carried out in the SCF;
- 3) the user abandons the request (in any state).



*Prompts and deregistration for outgoing UPT call*

- - - - - originating network - - - - ->  
 ref. CCAF                    CCF/SSF                    SCF                    SRF

1) In a network with automatic Calling Line Identification:

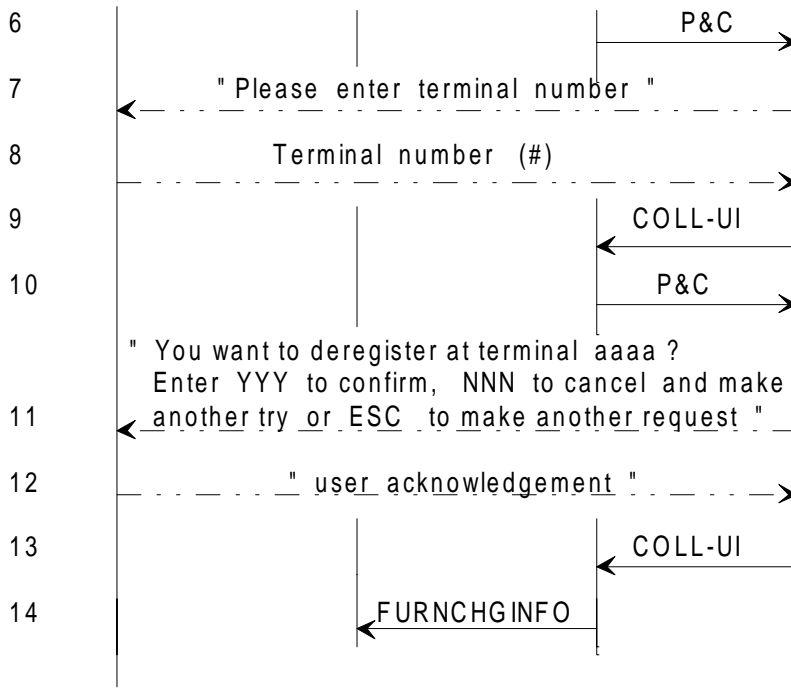


==> If the entry is NNN go to 6, else go to 5:

==> If the entry is YYY go to 15, if the entry is ESC go to 31.

==> If the maximum number of cancelled attempts is reached go to 51.

2) In a network with no Calling Line Identification:



==> If the entry is YYY go to 15,

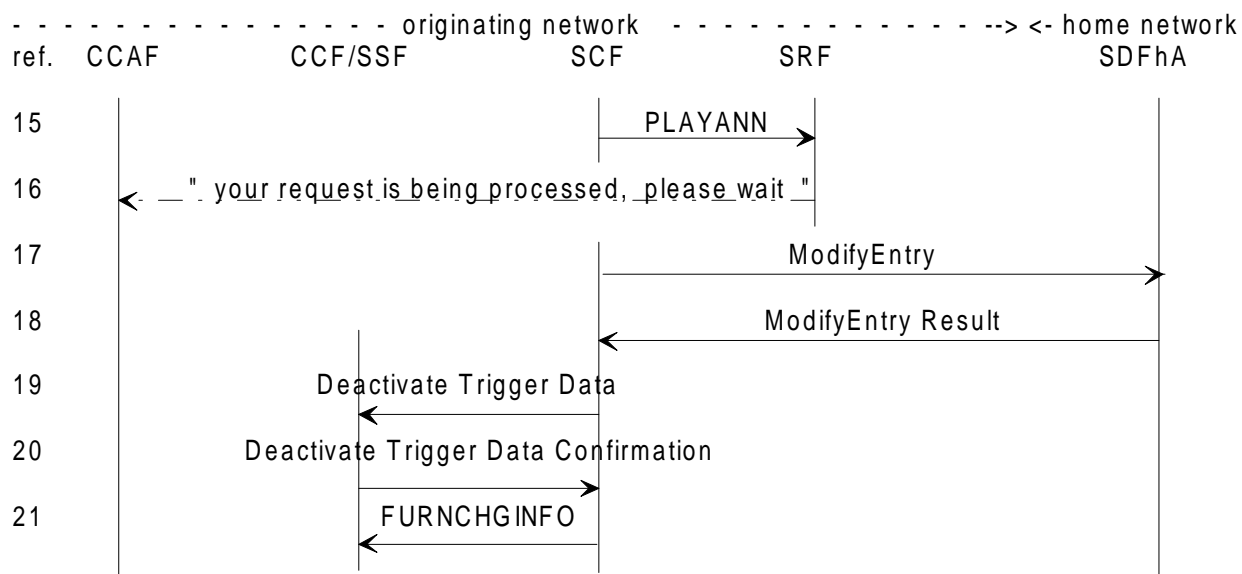
==> If the entry is NNN go to 41,

==> If the entry is ESC go to 31,

==> If the maximum number of cancelled attempts is reached go to 51.

**Figure 5.15 (sheet 1 of 2): Prompts and deregistration for outgoing calls**

Deregistration for outgoing UPT calls

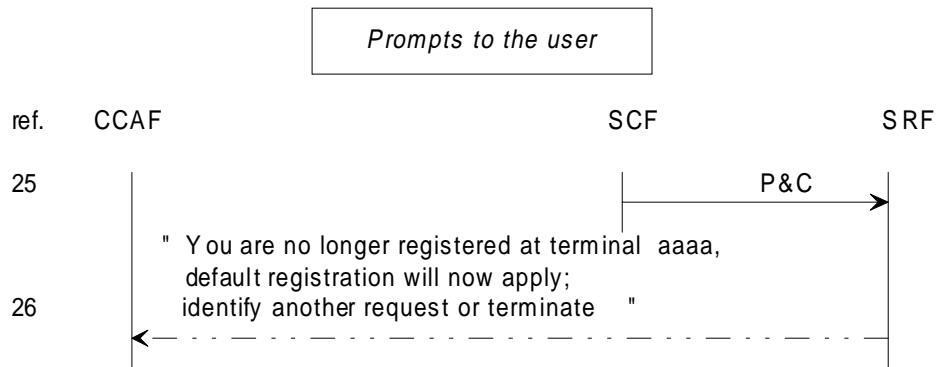


==> If deregistration is successful go to 25

==> If the maximum number of rejected attempts is reached go to 51

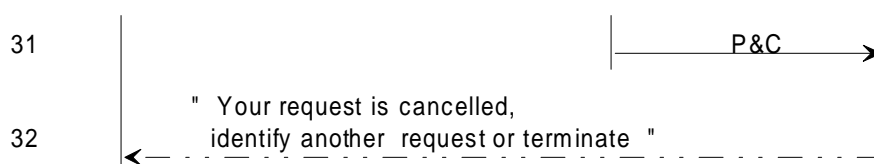
==> else go to 41

**Figure 5.15 (sheet 2 of 2): Prompts and deregistration for outgoing calls**

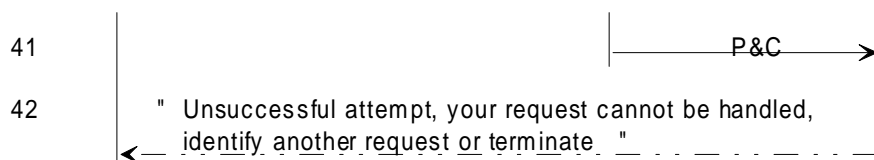


Logical output 1: ==> go to relevant procedure,  
 Logical output 2/3: ==> go to *UPT A-party initiated release*

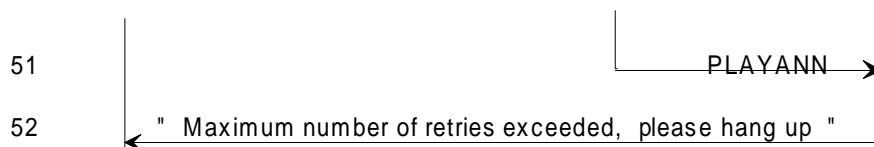
Cancelled or denied request



Logical output 1: ==> go to another procedure  
 Logical output 2/3: ==> go to *UPT A-party initiated release*



Logical output 1: ==> go to another procedure  
 Logical output 2/3: ==> go to *UPT A-party initiated release*



logical output 2/3: ==> go to *UPT A-party initiated release*

**Figure 5.16: Prompts to the user**

Notes on *deregistration for outgoing calls*

IF ref.:

- 1,2 The data retrieval may be necessary to obtain the current registration of the user (to prompt the user accurately).
- 3-6 The user is prompted to confirm or cancel deregistration. User acknowledgement is received in the SCF.
- 7 The "FurnishChargingInformation" operation is sent to instruct SSF to update the record.
- 8-11 When the user validates the deregistration, the SDFhA is updated. A waiting prompt is given to the user.

- 12 See 7.
- 17-18 The service profile is updated by the SCF according to the deregistration request.
- 19-20 The SCF requests the SSF/CCF to change the value of activation/deactivation control field to deactivate value. If the trigger data has the Registrar Identifier field, the value of this field is set to NULL (see ITU-T Recommendation Q.1224 [3]).
- 25, 26 SRF is ordered to give the user a positive acknowledgement. When deregistration is completed successfully, the user may want another UPT service (e.g. an outgoing call). For this purpose the user may make a new feature request.
- 31, 32 When deregistration is not confirmed, the user is requested to hang up or to make another feature request.
- 41, 42 When deregistration is not accepted by the home network for any reason e.g. no prior registration (if this has not been checked during *Feature request identification*), the user is requested to hang up or to make another feature request.
- 51, 52 The SRF prompts the user that the maximum number of rejected requests is reached. The count of the number of attempts is done in the SCF. The user is asked to hang up.

## 5.5 Outgoing UPT Calls when already registered

In that case, the UPT user is already registered at the terminal he is using (he is the only one). Any call from this terminal will be charged to the registered UPT user.

The description of such an outgoing call will be similar to the single outgoing call (see UPT phase 1) without authentication.

The three possible scenarios are recalled hereafter (see also 5.4):

- a) the line at which the user is registered is temporary marked;
- b) the UPT user dials a specific UPT access code to indicate that the Outgoing call procedure has to be activated;
- c) the UPT user dials the UPT access code (UPTAC) and the network understands that the outgoing call procedure has to be activated (with a preliminary check in the SDFo).

*The preferred scenario is a), it is described hereafter (scenario c is in Annex A).*

### 5.5.1 Outline description

The following is a high-level description of the actions required for the network to set up an outgoing UPT call when registration previously occurred.

The prerequisite sequences for phase 1 outgoing UPT calls are no longer needed because of the specificities of the three access scenarios. We do not describe the optional (weak at least) authentication that could be added (optional feature).

- 1) access to the service;
- 2) prompt user to input destination number and Collect destination number;
- 3) authorize destination number (optional, interaction with SDFhA);
- 4) if number is a UPT number, translate it to the called UPT user's current InCall location;
- 5) Disconnect SRF;
- 6) arm A-disconnect and B-disconnect trigger (DP 9) (twice) and triggers to detect call set-up failure (DPs 4, 5, 6); also arm DP 8 to detect mid-call feature activation (if required) and activate application timer on "B-party no answer" (if required);
- 7) "Furnish Charging Information" operation (or other charging operation);

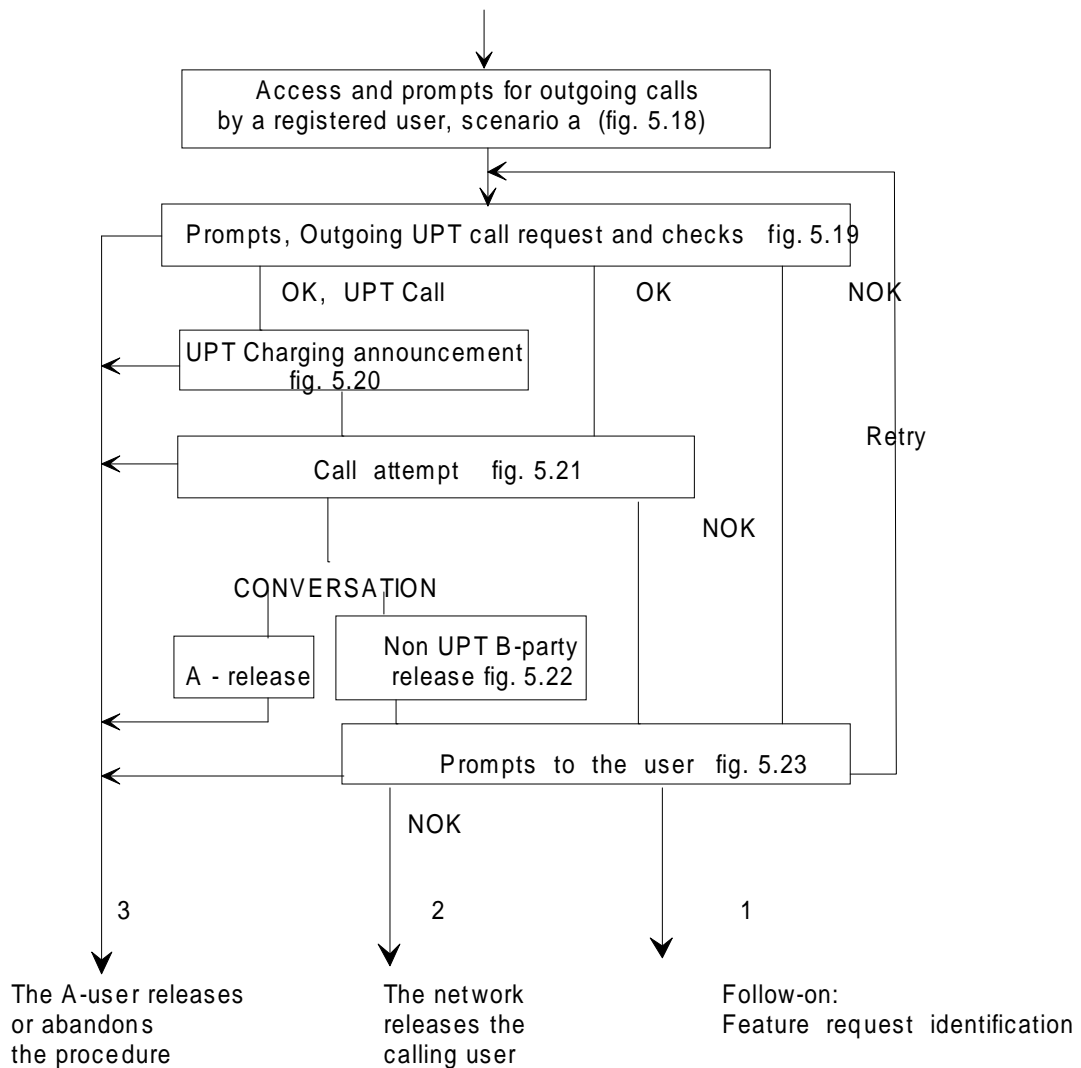
- 8) "Call Information Request" operation (if transfer of call data to SDF at end of call);
- 9) connect to destination number using "Connect" operation.

## 5.5.2 Information flow diagrams

This is a call from a UPT user possibly roaming but registered in the network from where he/she is calling. The called number may be any number. *Of course, charging is a national or operator matter.*

NOTE: The information flows related to supplementary services (Call Forwarding, ...) are not to be used for the time being, since these supplementary services are not clearly defined yet.

No prerequisite sequences.



**Figure 5.17: Outgoing UPT call by a registered user**

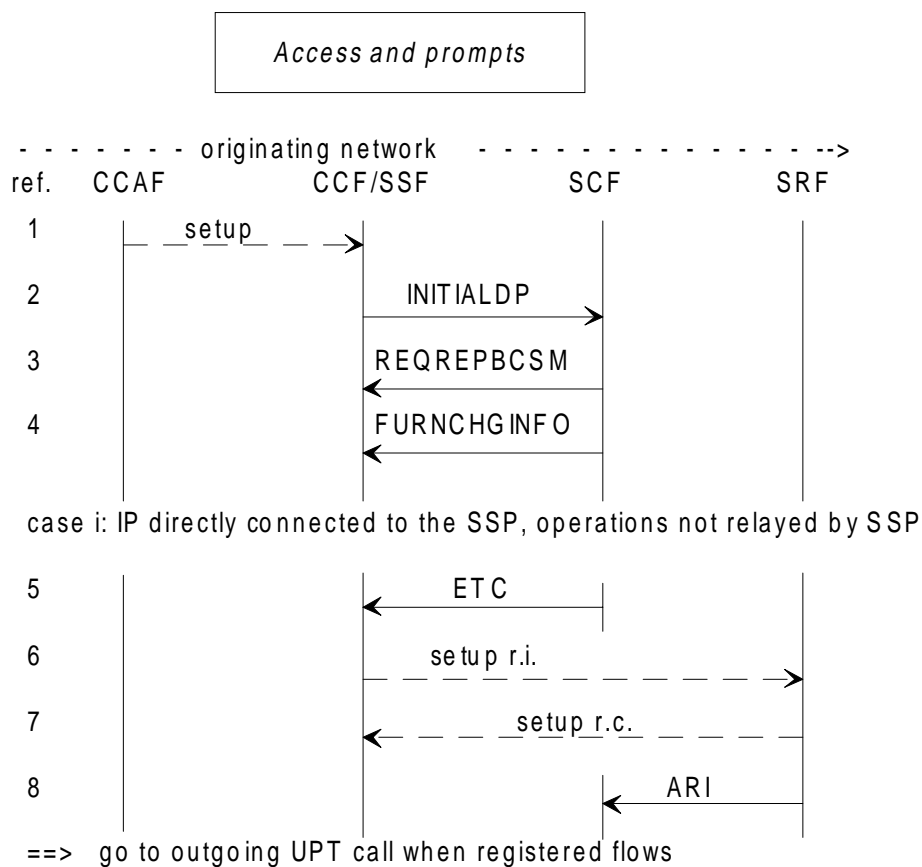
Prompts are given to the user according to allowed service options.

The logical outputs of the procedure are:

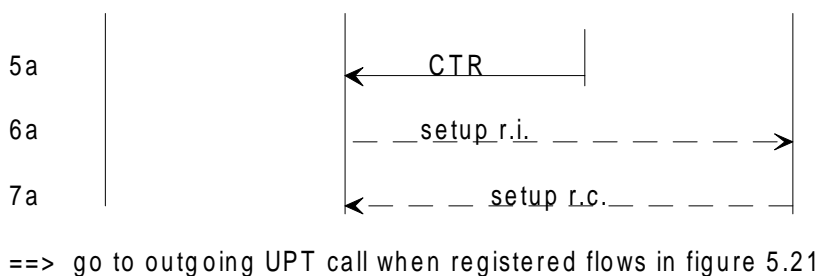
- 1) the user is allowed to request another feature (follow-on);
- 2) the user is released by the network after a prompt;
- 3) the user abandons the request before call set-up or hangs up during call set-up or conversation or while being prompted after call attempt.

5.5.2.1 Access to UPT for outgoing UPT call when registered in case of scenario a): the line at which the user is registered is temporary marked

Then the phase 1 "Access, Identification and Authentication" description is not completely valid: only first 8 flows are needed and the description for 1-2 is slightly enhanced.



case ii: IP integrated or directly attached to the SSP. The SSP relays the operations.



**Figure 5.18: Access and prompts for outgoing call by a registered user**

IF ref.:

- 1-2 The line is marked, which enables the SSF to immediately trigger the SCF for outgoing UPT call when registered. For simplification, we consider here that the optional Registrator Identifier was given at registration and that it is the PUI. If not, the SCF should ask the UPT user to provide his PUI (e.g. to be able to charge him!).
- 3 REQREPBCSM contains the list of events and their monitoring mode (may be useless if the DPs are statically armed).
- 4 The FURNCHGINFO operation is sent to instruct SSF to create a call record for the following user request.

5-8 The SSF is ordered to connect an SRF using the ETC operation.  
The ARI operation is used (SCF-SRF operations not relayed by SSF).

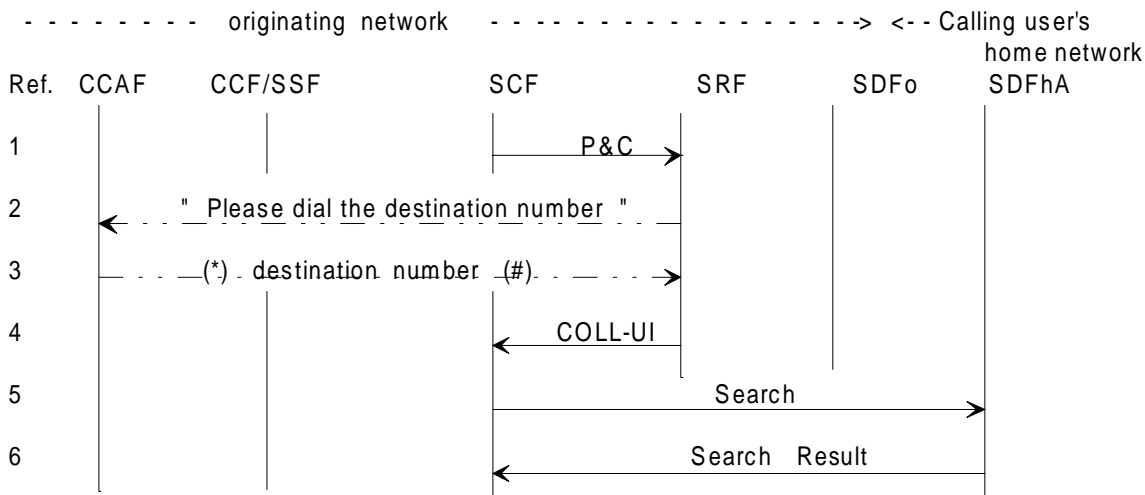
5a-7a The SSF is ordered to connect an SRF using CTR.  
In this case the SCF-SRF operations are relayed by the SSF.

Then go to 5.5.2.2.

### 5.5.2.2 Outgoing UPT call when registered (end of procedure)

Before the following flows, the SCFo has to have recognized an UPT outgoing call request (because of an armed trigger in the SSF or after treatment on the access code used by the UPT calling party) and retrieved the PUI of the calling user (in the SDFo or the SDFh if not stored in SDFo at registration).

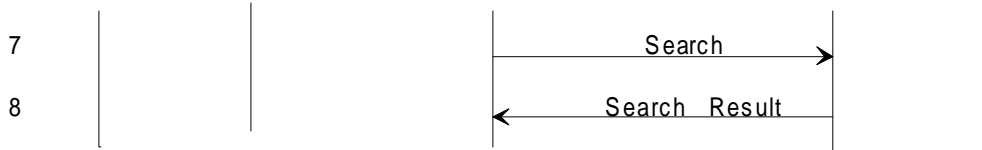
Prompts, Outgoing UPT call request and checks



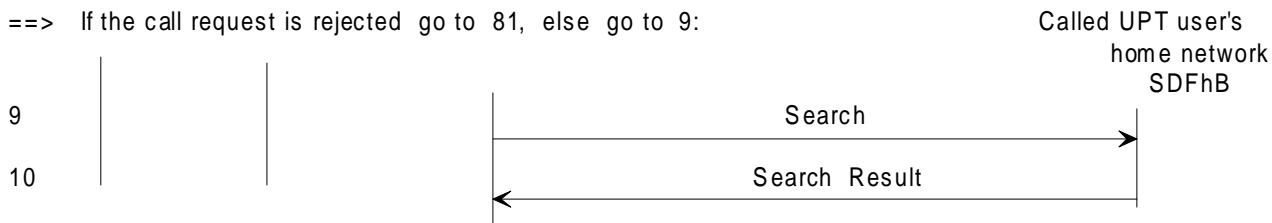
==> If the call request is rejected go to 81  
 ==> else if the B-number is: - a UPT number: go to 7  
 - not recognized as a UPT number: go to 11

Note : not recognized means here:

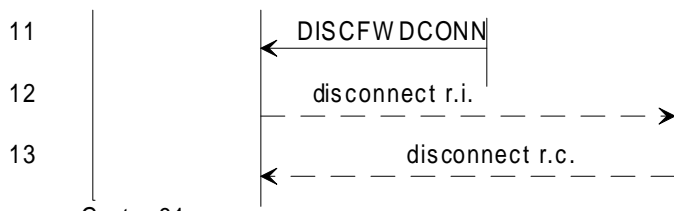
- the B-number is not a UPT number;
- the B-number is a UPT number but not understood as such by the SCF (e.g. if the UPT numbers are not internationally specified). The call will be routed over the B-user's home network; the B-user's location will be retrieved by the B-user's home network.



==> If the call request is rejected go to 81, else go to 9:



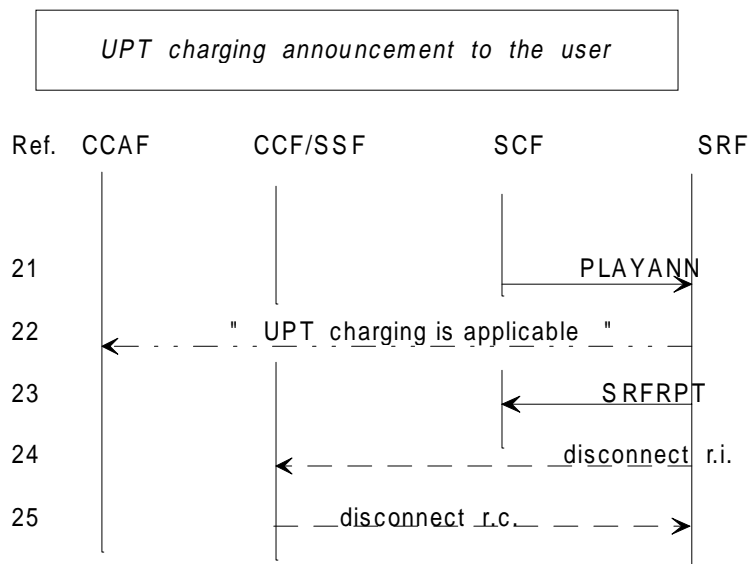
==> If the call request is rejected go to 81, else go to 21  
 ==> After 6, 8, and 10 if the maximum number of rejected attempts is reached go to 101



==> Go to 31

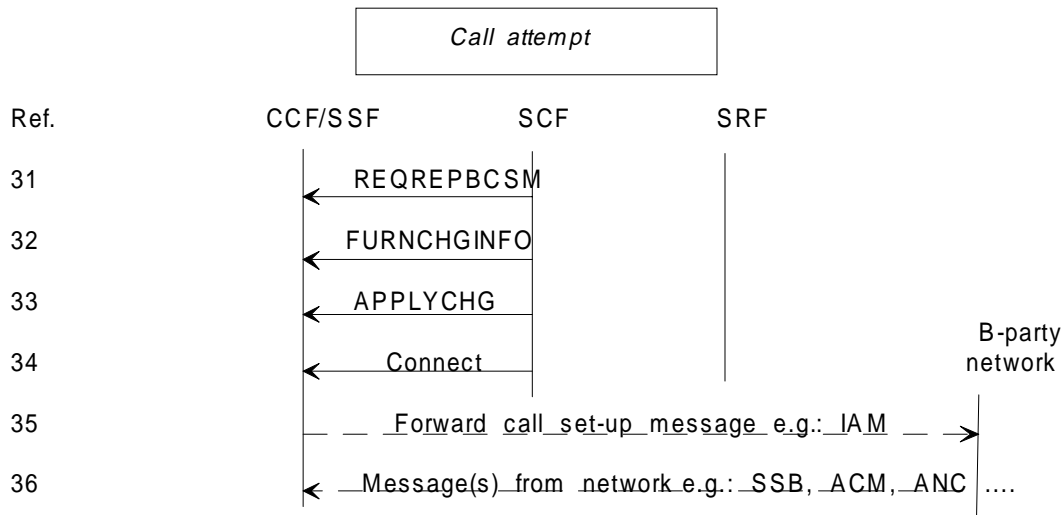
Figure 5.19: Prompts, outgoing UPT call request and checks





==> If the user hangs up, go to the *UPT A-party initiated release*  
 ==> else go to 31

**Figure 5.20: UPT charging announcement**



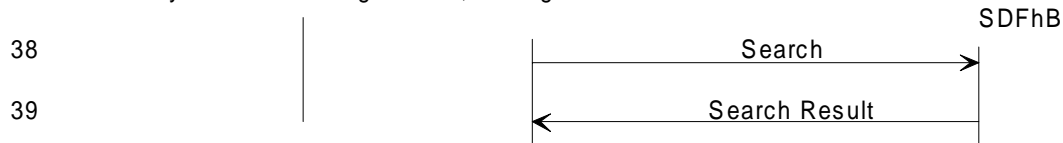
==> On busy, congestion or no-answer go to 37  
 ==> When call set-up is successful:

C O N V E R S A T I O N

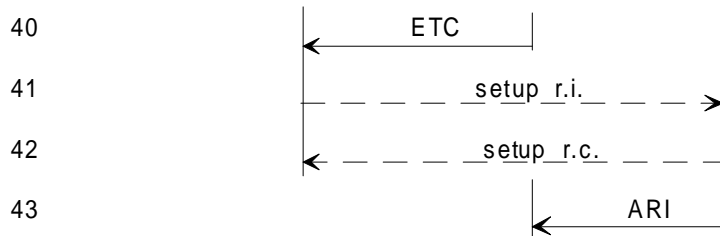
The called user hangs up first: go to 51  
 The calling user hangs up first: go to the *UPT A-party initiated release*



==> On busy or no-answer go to 38, else go to 40



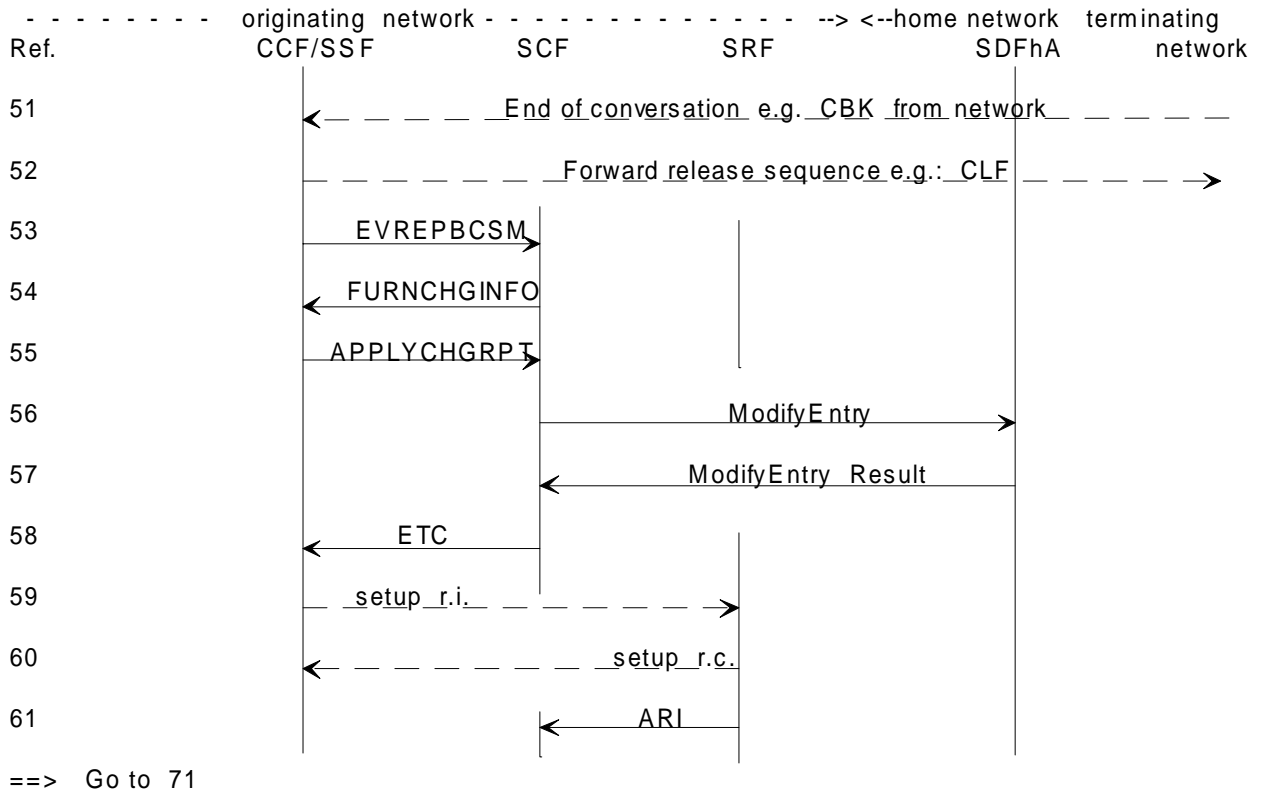
==> If call forwarding is activated, a redirected call attempt is made: go to 31, else go to 40



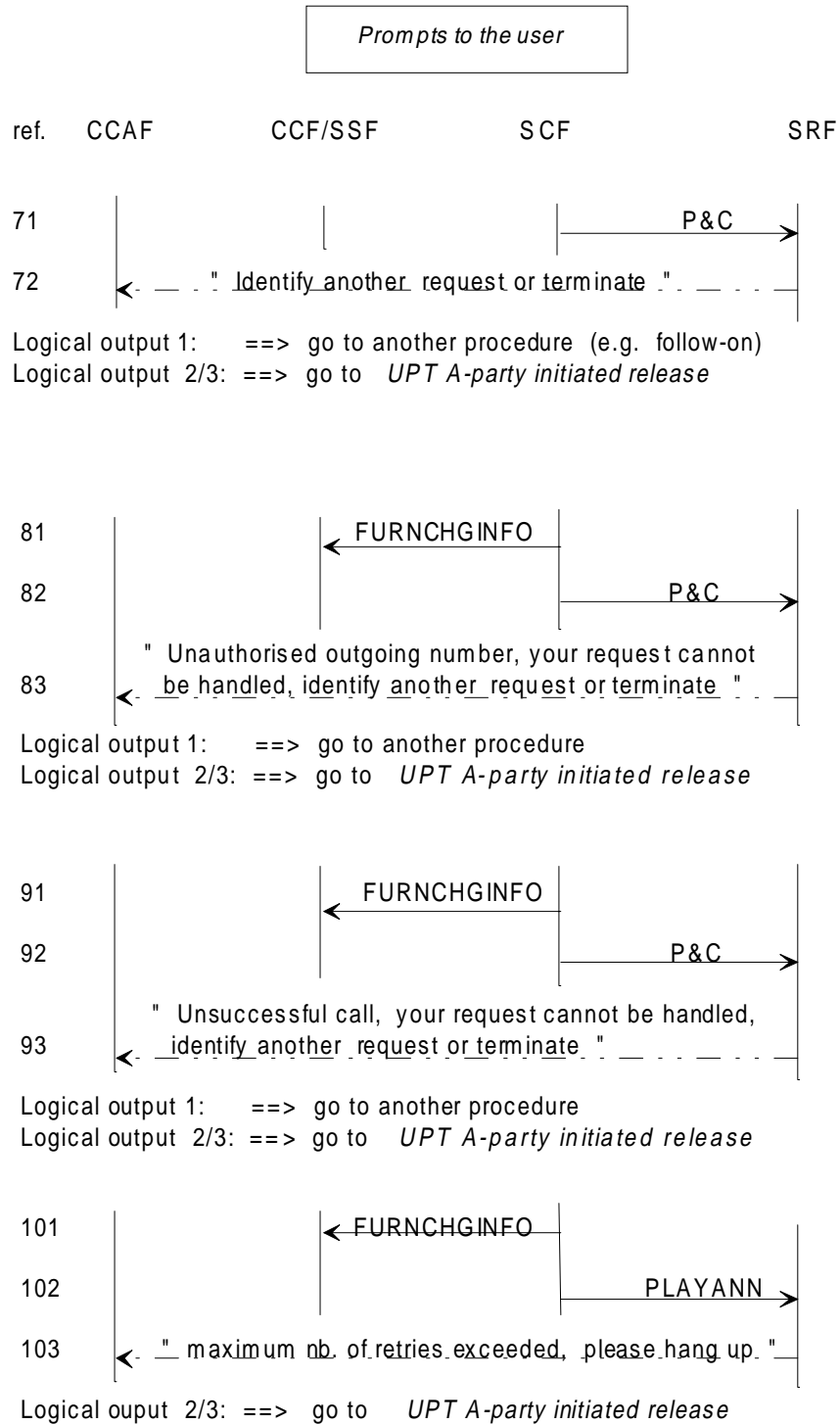
==> go to 91

**Figure 5.21: Call attempt**

non-UPT B-party initiated release with follow-on



**Figure 5.22: Non-UPT B-party release, with follow-on**



**Figure 5.23: Prompts to the user**

Notes on *Outgoing UPT call by a registered user*

IF ref.:

**Assumption:** the SCF recognizes UPT numbers and controls call set-up.

- 1-4 The B-number can be given in different ways, depending on networks. At most, the international significant number is required.
- The dialed number can be any number, also a UPT number. The digits are echoed (the user can abandon the procedure by hanging up).
- A flag (#) may be dialed to indicate the end of the destination number.
- The SRF sends the number sequence to the SCF.
- The B-number is analyzed in the SCF.
- 5-6 The SDFhA is queried to check if particular restrictions apply to the dialed number.
- 7-8 SDFo is queried to check if there exist particular agreements between the local service provider and the called user's home provider for establishing outgoing UPT calls.
- 9-10 The SDFhB query is made to retrieve the location of the called user and the charging reference point.
- Particular restrictions may also be checked in SDFhB when necessary.
- 11-13 SSF is ordered to release the SRF.
- 21-22 The user is informed that particular charging conditions may apply.
- The user is thus given the opportunity to abandon the call.
- 23-25 When the announcement is played, disconnection of the SRF takes place (SRF initiated disconnection).
- 31 The SSF is required to suspend processing at given detection points (such as CBK after a successful call or on busy, congestion and no answer).
- 32 The "FurnishChargingInformation" operation is sent to instruct SSF to create a call record for the following call attempt.
- 33 "ApplyCharging" could also be sent (this operation is not necessary if an earlier request is pending).
- 34 The SSF is required to set up the call.
- 35-36 SSFo routes the call accordingly and receives backward signaling.
- If the B-party number is a (recognized) UPT number or not a UPT number, then the call is "normally" routed to the terminating CCAF.
- If the B-party number is a UPT number but not recognized, then the call is routed to the (UPT) B-party home network and, before alerting to the terminating CCAF, triggering occurs in order to retrieve the CCAF location and further routing (similar to flows 7, 8...).
- 37 When the call is unsuccessful, the SCF is informed. The no answer event is generated by an application timer in the SSF.
- 38-39 If a busy or no answer indication is received and if the called party is a UPT user, a request is made to the B-user's home data base to check whether the call forwarding service is activated.
- If call forwarding is activated, the redirection address is retrieved and a new call attempt is made.
- 40-43 When the call set-up is unsuccessful or when the request is denied, it may be necessary to reconnect SRF.
- Several SRF connection scenarios are possible.

- 51-53 The called party ends the conversation. SSF initiates an immediate disconnection sequence of the forward circuit. The disconnection sequence is network dependent.
- SSF reports to SCF.
- 54 The "FurnishChargingInformation" operation is sent to instruct SSF to update the record.
- NOTE: For the purpose of the follow-on, the creation of a new record is done when the user places a new request.
- 55-57 Since an "ApplyCharging" has been issued, the record is returned to the SCF.
- The record is sent to the SDFhA and, in case of UPT user to UPT user call, to the SDFhB.
- 58-61 To offer the follow-on, the SCF orders the SSF to reconnect an SRF.
- Several SRF connection scenarios are possible.
- 71-72 SRF is ordered to prompt the calling user, which is given the opportunity to place another service request.
- 81 See 54.
- 82-83 The calling user is informed that the dialed B-number is not authorized and is requested to hang up or to make another feature request.
- 91 See 54.
- 92-93 The calling user is informed that the call is unsuccessful and is requested to hang up or to make another feature request.
- 101 The "FurnishChargingInformation" operation is sent to instruct SSF to update the record.
- 102-103 The SRF prompts the user that the maximum number of denied call attempts is reached. The count is done in the SCF.
- The user is asked to hang up.

## 5.6 Incall Registration procedure

The following assumptions are made with respect to the Incall Registration procedure:

- after the Incall Registration, the SDFh only stores a reference to the visited area (i.e. SDFo);
- before the Incall Registration, the visited database (i.e. SDFo) may or may not already have information on the UPT user.

The UPT phase 1 description for this procedure can apply, of course. However, another solution can be proposed in addition to this solution; indeed, there is the possibility for a UPT user to register via call unrelated procedure, as described hereafter.

### 5.6.1 Information Flows in call unrelated scenario

It is assumed that the following procedure was preceded by an identification-authentication.

We describe here a way to perform this procedure without establishing a call, that is to say without the need of a call between the SCUAFo and the CUSFo. The following description is based on "Functional Terminal" procedure. We consider also here that a service profile transfer using SDF-SDF relationship is made. This may previously happen (e.g. when registering for outgoing calls) or during this Incall registration procedure.

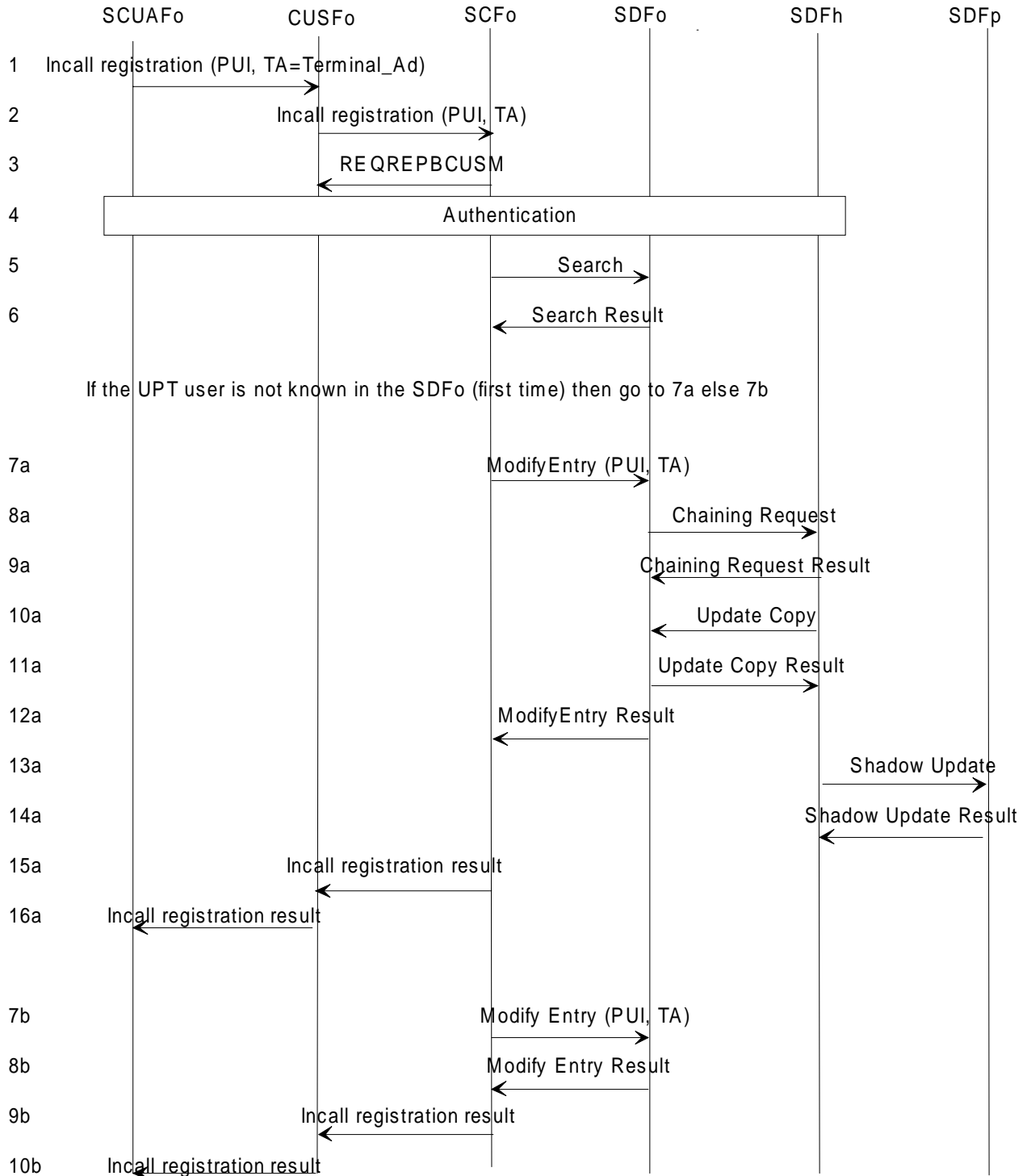


Figure 5.24: UPT incoming call registration (with service profile transfer) SDF-SDF

### Notes on *Incall registration (call unrelated)*

IF ref.:

- 1 The SCUAFo sends an InCall registration request towards the CUSFo. This is done using Facility/Register message in D channel.
- 2 Receiving the request from the SCUAFo, the CUSFo triggers the SCFo.
- 4 Authentication of the calling UPT user is processed and agreements with the home service provider checked.
- 5, 6 Thanks to the PUI, the user was identified. The SDFo is queried by the SCFo to check if this UPT user is registered in SDFo. The UPT Numbering Plan, the use of Personal User Identification (PUI) and/or UPT Number (UPTN) and the use of an appropriate Access Code (AC) are subject to further study.

If it is the first time that the user is registered in the SDFo, the flows are the "a" flows, else the "b" ones.

- 7a-9a The SCFo updates the service profile in the SDFh through the SDFo.
- 10a, 11a The service profile is copied by the SDFh to the SDFo.
- 13a, 14a If needed, the previous copy of the service profile is removed from the SDFp by the SDFh.
- 7b, 8b The service profile is updated in the SDFo with new location.

## 5.7 Call Pick-up

Call Pick-up allows a UPT user to be alerted on a terminal specified by him/her during the registration procedure, and to answer the call on any other terminal. For instance, the user could be alerted on a paging device, and pick-up the call at any telephone set. As far as the network aspects are concerned, the difficulty is that the physical resources for alerting may be located very different from the physical resources used for answering.

### 5.7.1 Scenarios

Several scenarios can be envisaged for implementing the feature Call Pick-up. Three of them are listed below.

- 1) The call is always routed through a fixed point in the network. The UPT user could answer the call by dialling a dedicated number. The network will set up a connection between the terminal used for answering and the fixed point, and relate this connection to the one already present (i.e. the one from the calling user to the fixed point).
- 2) During the alerting phase, the called UPT user will be informed of a number to dial in order to complete the call. This number will essentially be a routing address towards the SSP at which the originating part of the call was interrupted. Once the call from the called UPT user towards the SSP arrives at the SSP, the two legs will be connected.
- 3) The UPT user just indicates to the network that (s)he wants to answer the incoming call (e.g. by pressing a standardized button, or dialling a standardized service code). The network will recognize this request and automatically find out the originating location of the call (i.e. the SSP). Finally the total call can be established.

In all cases above, it seems appropriate that the called UPT user has to identify and authenticate himself, because the call is picked up from a terminal different from the terminal that is ringing.

#### Constraints

From the IN CS2 point of view, a number of constraints exist to support Pick-Up. They are as follows:

Assuming that the called UPT user is the same user which will pick up the call, this feature can be provided if the first call to the UPT user is an IN call (which is the case). So for this first call, the interrogating SSF should support Call Party Handling capabilities.

The called UPT user should pick up the call at the new terminal by dialling a specific access code. This access code should trigger the same previous SSF. The access code should also enable the SCF to retrieve the context of the previous waiting call.



To enable this requirement, the alerting telephone and the picked up terminal should be connected to the same local exchange or the picked up call should trigger the same interrogating SSF. In each case, the format of access code dialled by the user is not the same. For the first case, we can use a generic access code + the alerting address but in the second case we need to be specific to be able to route the call to the interrogating SSF.

NOTE: From the above reason (trigger the same SSF), it may be difficult to provide call pick-up if alerting is on a terminal from another network (e.g. pager).

### Comparison of the scenario

From a user point of view, scenario 1 and 3 above are nearly as much attractive, whereas option two is least preferable, because in this case the user has to dial more digits for answering an incoming call (and restrictions are likely if the SSP in abroad).

From a network point of view, e.g. in terms of optimized routing, scenario 2 and 3 are favourable. Also, having a single point for routing all UPT calls (scenario 1) is not very acceptable for implementation of a service that implies many call routings.

Hence, considering both user and network perspectives, scenario 3 seems to be the best choice. In addition, from a network perspective, this scenario is the more general one, since it does not restrict its implementation to just one. Therefore, in the present document, scenario 3 is elaborated in more detail.

## 5.7.2 User Procedures

In order to describe a configuration for which call pick-up will have the possibility to succeed, we consider hereafter that incoming call is processed thanks to two triggers (originating and terminating sides). As a consequence, call pick-up is described among two networks, considering that the alerted terminal and the terminal used by the called party belong to the same network and connected to the same SSF. A high level is proposed in the figure 5.25:

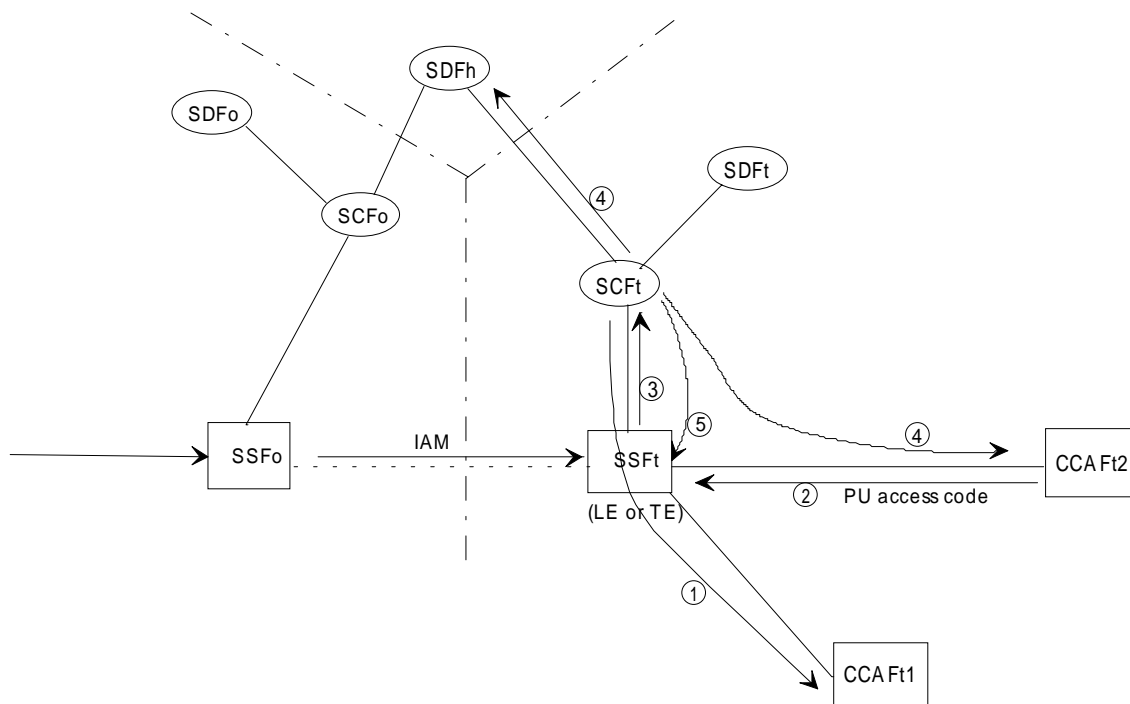


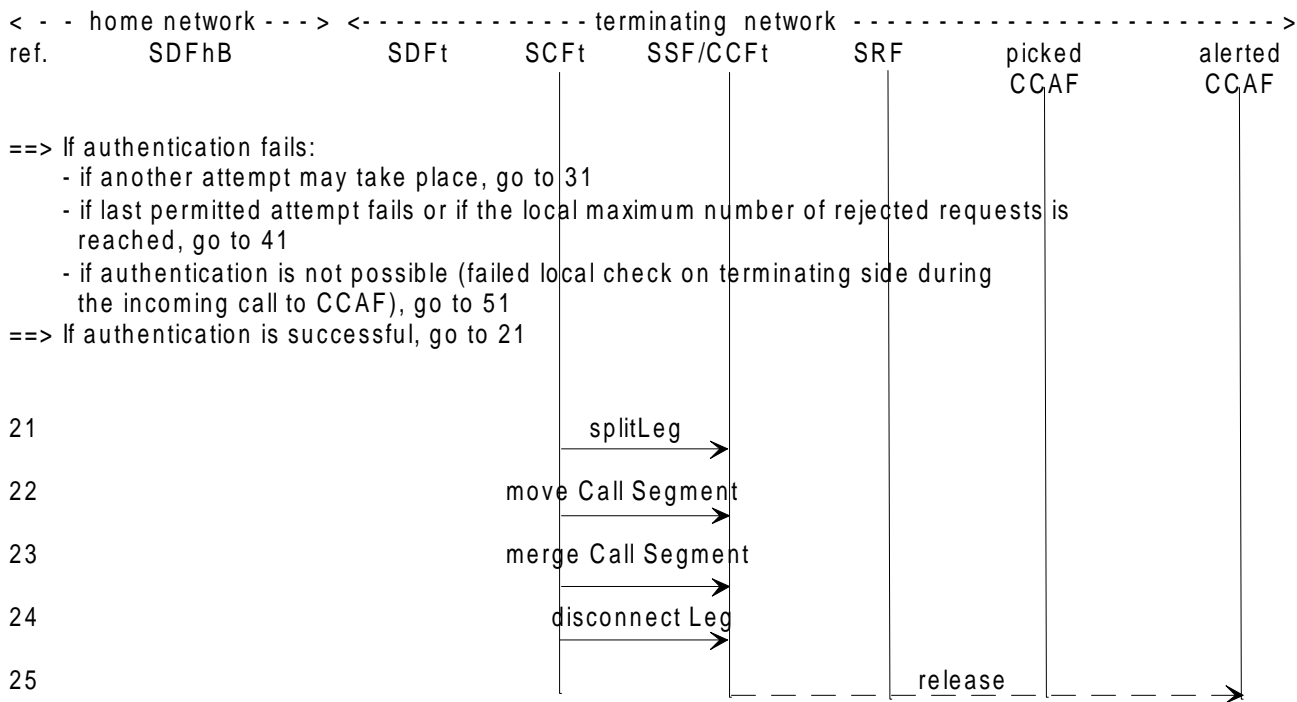
Figure 5.25: Call pick-up scheme

## Comments:

- before 1), the incoming call is processed towards the CCAft1, with a second trigger on the SSFt;
- 1) the SCFt orders the SSFt to set-up the call to the CCAft1, the terminal is alerted;
- 2) aware of this alerting, the called user picks up the terminal in CCAft2, dialling the Call Pick-Up access code;
- 3) the SSFt triggers the SCFt;
- 4) the SCFt processes identification and authentication of the user (only weak authentication is described here);
- 5) if authentication is successful, the SCFt orders SSFt to release the leg to the CCAft1 and to connect the legs on the CCAft2 side and on the originating side.



Call pick-up decision



==> When call set-up is successful:

C O N V E R S A T I O N

The calling user hangs up first: go to 61  
 The called user hangs up first: go to *UPT B-party initiated release*

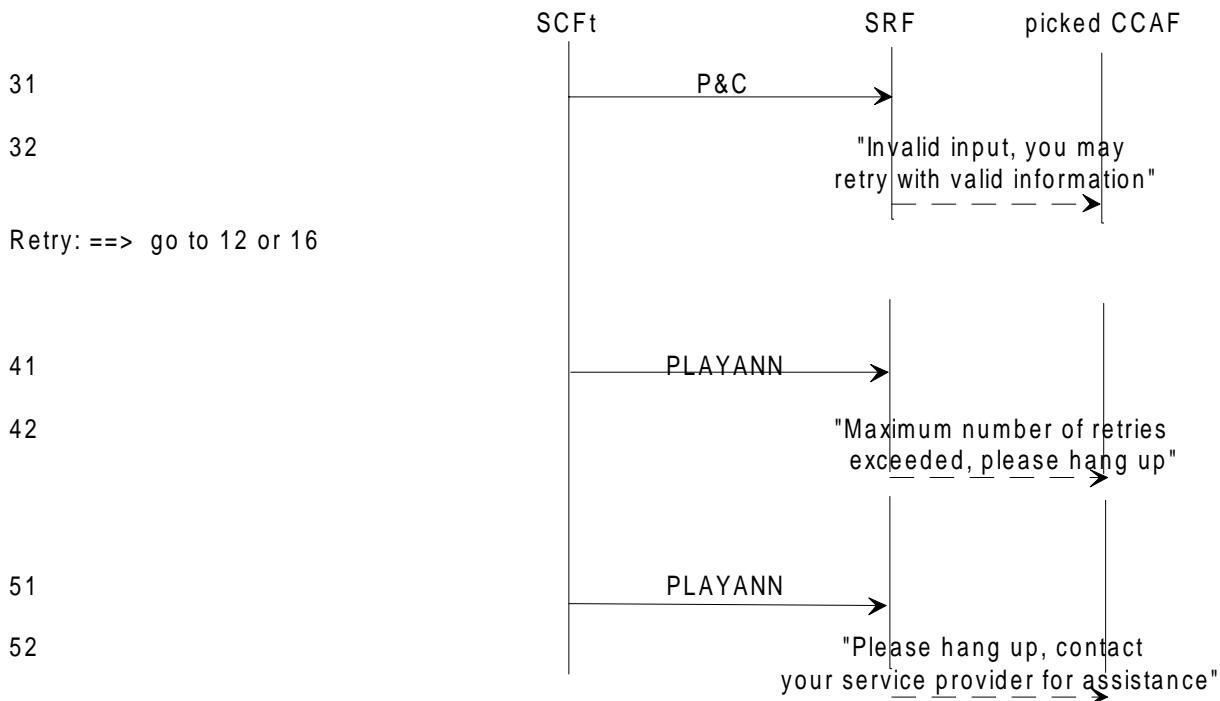
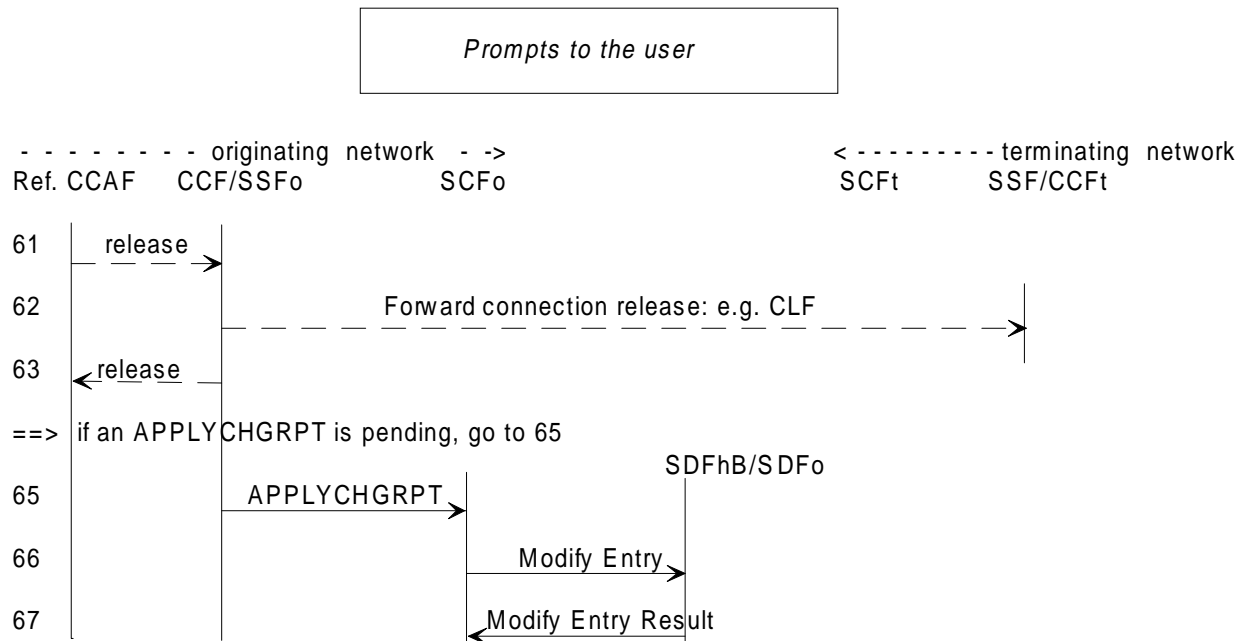


Figure 5.27: Call pick-up



**Figure 5.28: Prompts to the user**

#### Notes on *Call Pick-Up*

IF ref.:

Before flow 1, the flows and comments are identical to the ones used for incoming UPT call with double trigger on originating and terminating sides.

- 1 The called UPT user picks up another terminal and dials the Pick-Up access code. This access and the CLI are passed to the SSF/CCFt.
- 2 The CCF/SSFt triggers "Initial Detection Point".
- 3 REQREPBSCM contains the list of events and their monitoring mode (may be useless if the DPs are statically armed)
- 4 The FURNCHGINFO operation is sent to instruct SSFt to create a call record for the following user request.
- 5-8 The SSFt is ordered to connect an SRF using the ETC operation.  
The ARI operation is used (SCF-SRF operations not relayed by SSFt).
- 5a-7a The SSFt is ordered to connect an SRF using CTR.  
In this case the SCF-SRF operations are relayed by the SSFt.
- 10, 11 P&C enables the SRF to prompt the user.
- 12 In manual procedure the user sends the PUI.  
  
To avoid to wait for end of dialing recognition by a time-out, the user may use a star (\*) to speed up the procedure and then dial the PUPIN in the same sequence.  
  
After the PUPIN, a square (#) may be dialed to terminate the sequence.
- 13 "Collected Info" to SCFt contains information received from the user.
- 14-16 If the user doesn't dial the (#) and waits, he/she is prompted to send the PUPIN (Pick-Up PIN).  
  
The PUPIN request is systematic.

NOTE 1: Alternatively, an automatic procedure could be used with all authentication information sent in one string.

17 The complete string of information is received in the SCFt, a format check is applied.

NOTE 2: A local black-listing of users misusing the service may exist. However this has no impact on the Information Flows and is not reflected in the diagrams.

18, 19 The received information is sent to B-party SDFh in one string for authentication.

SDFhB monitors and keeps a count of the number of attempts, sends the result of authentication back to SCFt.

20 The "FurnishChargingInformation" operation is sent to instruct SSFt to update the record.

21 The SCFt asks the SSFt to split the leg towards the alerted terminal.

22, 23 The SCFt asks the SSFt to link the legs from the originating network and from the picked terminal.

24 The SCFt asks the SSFt to disconnect the leg towards the alerted terminal.

NOTE 3: The treatment done with flows 21-24 could be in different ways.

25 The call is released on the alerted terminal side.

31, 32 The SRF is ordered to inform the user that another attempt is allowed (no reason is given).

41, 42 The SRF prompts the user that the maximum number of rejected requests is reached (the count of the number of attempts is done in the SCFt). The user is asked to hang up.

51, 52 The user is asked to hang up. No further attempt is allowed, but the line is not blocked.

The user may contact the local/home provider for assistance.

61 The call is terminated by the A-party.

62-63 The forward and backward connections are released and an appropriate signal is sent backwards.

Flows 65-67 are optional.

65-67 When an "APPLYCHGRPT" is pending the record generated in the SSF/CCFo is returned to the SCFo and transferred to the SDFhB.

Another record may also be sent to the originating network.

---

## Annex A (normative):

Alternative description for some procedures when access to outgoing call for a registered UPT user is via scenario c)

### A.1 Information flows for UPT phase 2

The order in which the UPT user sends information to the UPT service provider in the network is gathered in figure A.1:

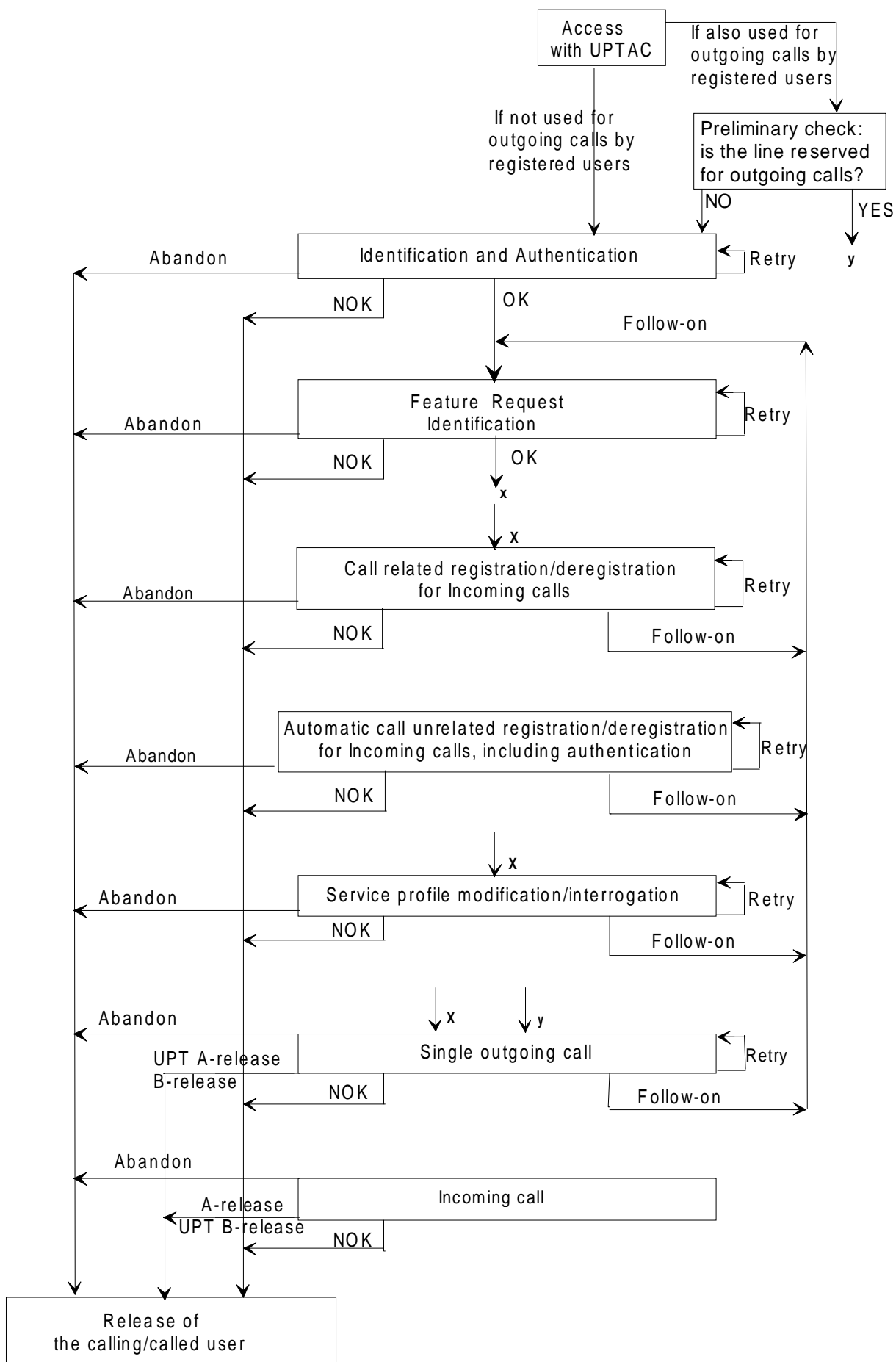


Figure A.1



## A.2 Procedures for personal mobility

### A.2.1 Registration for UPT outgoing calls

Hereafter are proposed call related descriptions for registration for UPT outgoing calls. As for registration for UPT incoming calls, it is possible to have a call unrelated procedure.

#### A.2.1.1 Outgoing call registration

Scenario c) is recalled below:

- c) the UPT user dials the UPT access code (UPTAC) and the network understands that the outgoing call procedure is being activated given the previous completion of outgoing UPT call registration.

#### Impact of scenario c) on general UPT procedures

The scenario c) implies some modifications in the usual way (as for phase 1) to process UPT procedures. These modifications are illustrated in figure A.2: dotted lines correspond to the phase 1 description (stage 2 and stage 3), continuous lines correspond to the ways UPT procedures have to be done if c) is used for outgoing UPT calls without authentication (note that the retrieval of the user identity is not illustrated in the figure A.2).

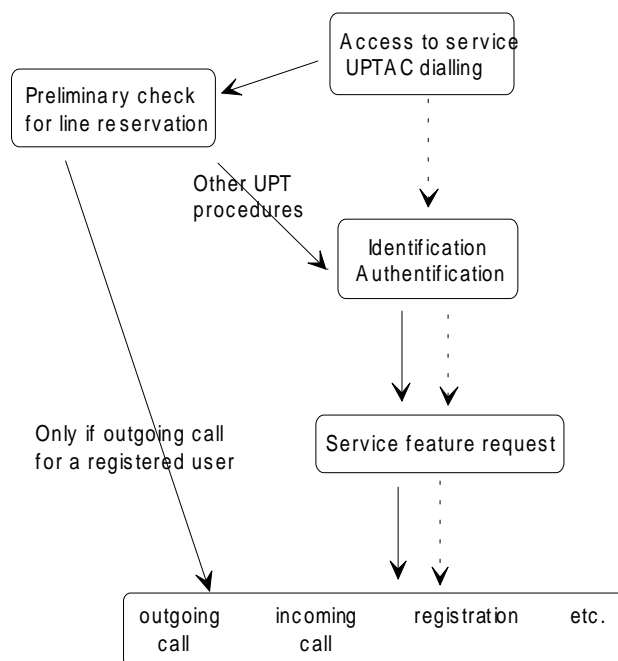


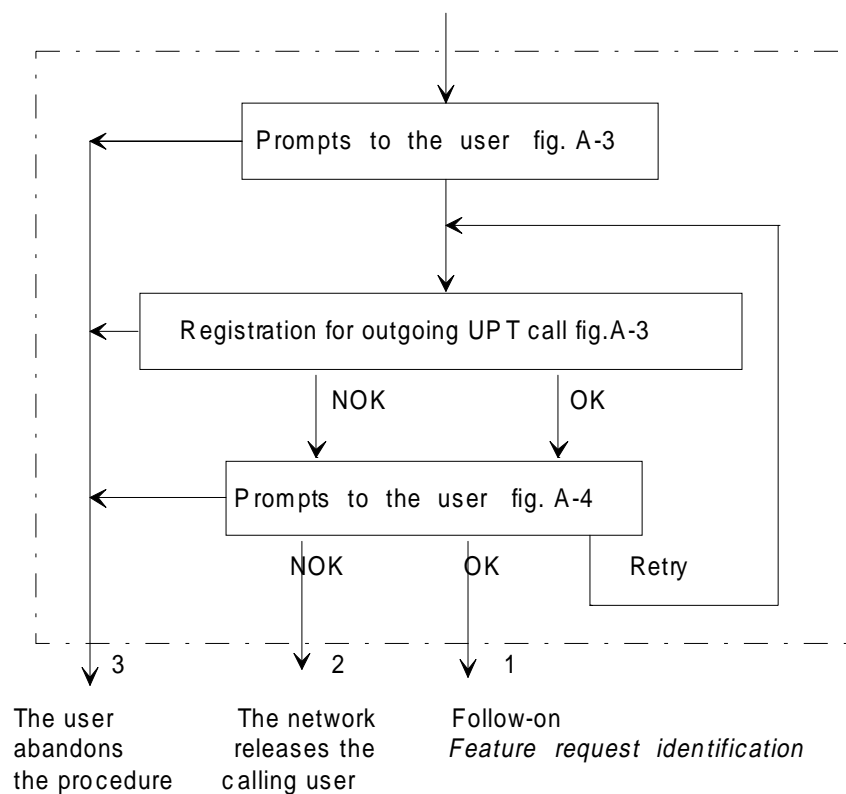
Figure A.2: Impact of scenario c) for outgoing calls and registration

#### Information flows

Prerequisite sequences:

- Access, identification and authentication;
- Feature request identification.

The organization of the registration sequence is given in the block diagram in the figure A.3:



**Figure A.3: Registration for outgoing calls**

As an option, the procedure includes the possibility for the user to impose limitations/restrictions to the registration.

Prompts are given to the user according to allowed service options.

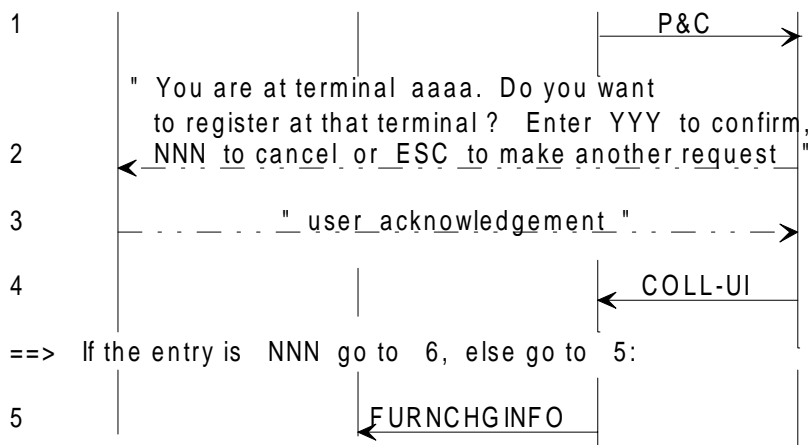
The logical outputs of the procedure are:

- 1) OK: the user is allowed to request another feature (follow-on);
- 2) NOK: the user is released by the network after a prompt (to prevent the service/network from being misused, e.g. abnormal number of retries after a request rejection, the network may release the user. This function is carried out in the SCF);
- 3) the user abandons the request (in any state).

Prompts and registration for outgoing UPT call

ref. CCAF                      CCF/SSF                      SCF                      SRF

1) In a network with automatic Calling Line Identification:

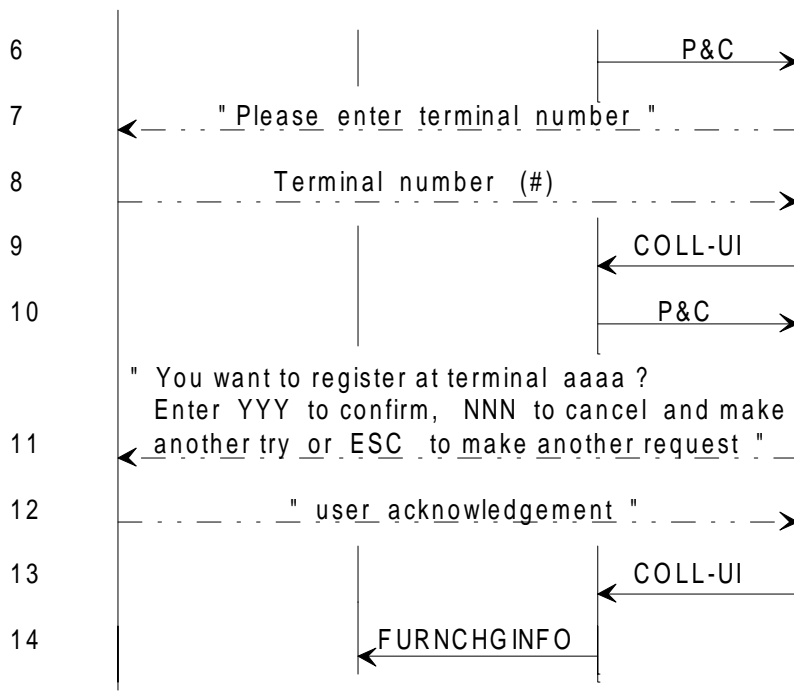


==> If the entry is NNN go to 6, else go to 5:

==> If the entry is YYY go to 15, if the entry is ESC go to 61.

==> If the maximum number of cancelled attempts is reached go to 91.

2) In a network with no Calling Line Identification:



==> If the entry is YYY go to 15,

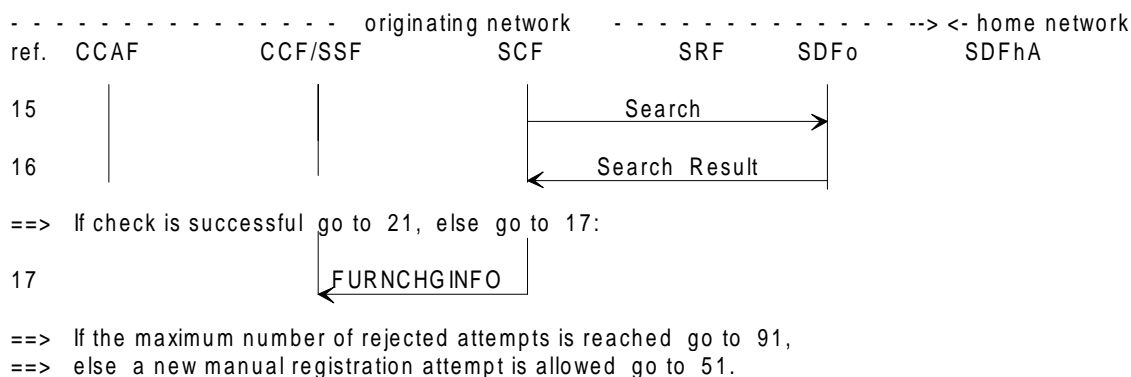
==> If the entry is NNN go to 71,

==> If the entry is ESC go to 61,

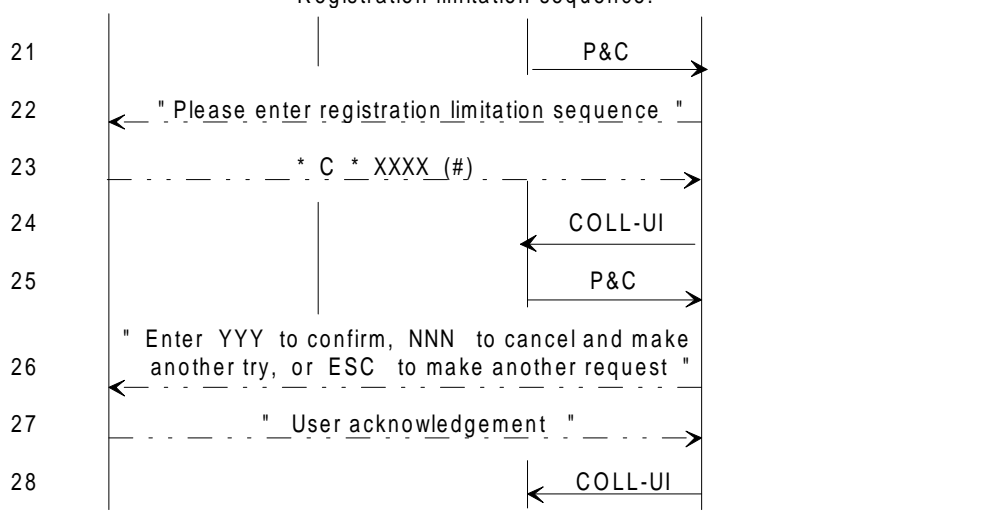
==> If the maximum number of cancelled attempts is reached go to 91.

**Figure A.4 (sheet 1 of 2): Prompts and registration for outgoing calls**

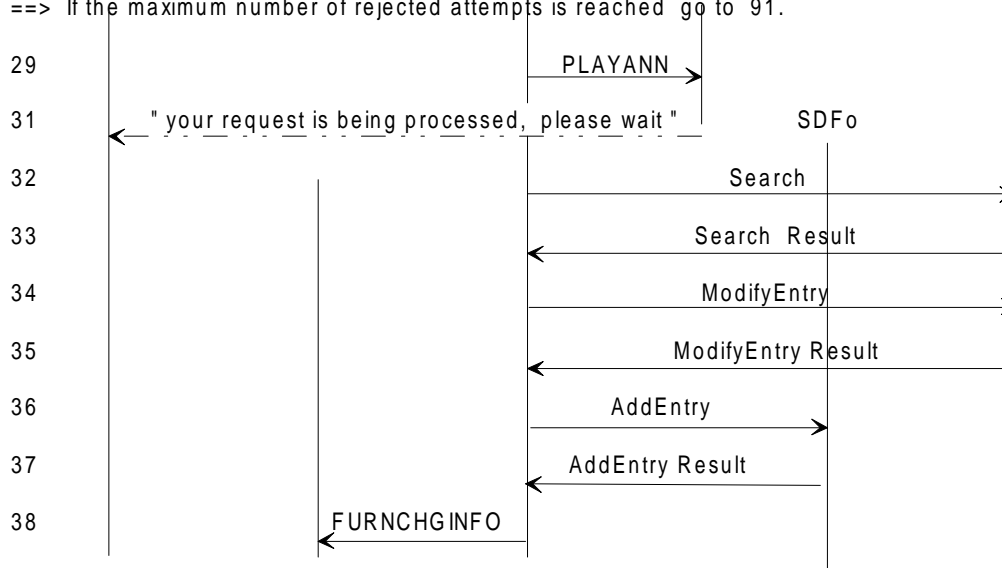
Registration for outgoing UPT call



## Registration limitation sequence:



==> If the entry is YYY go to 29,  
 ==> If the entry is NNN go to 81,  
 ==> If the entry is ESC go to 61,  
 ==> If the maximum number of rejected attempts is reached go to 91.



==> If registration is successful go to 41  
 ==> If the maximum number of rejected attempts is reached go to 91,  
 ==> else go to 101.

**Figure A.4 (sheet 2 of 2): Prompts and registration for outgoing calls**

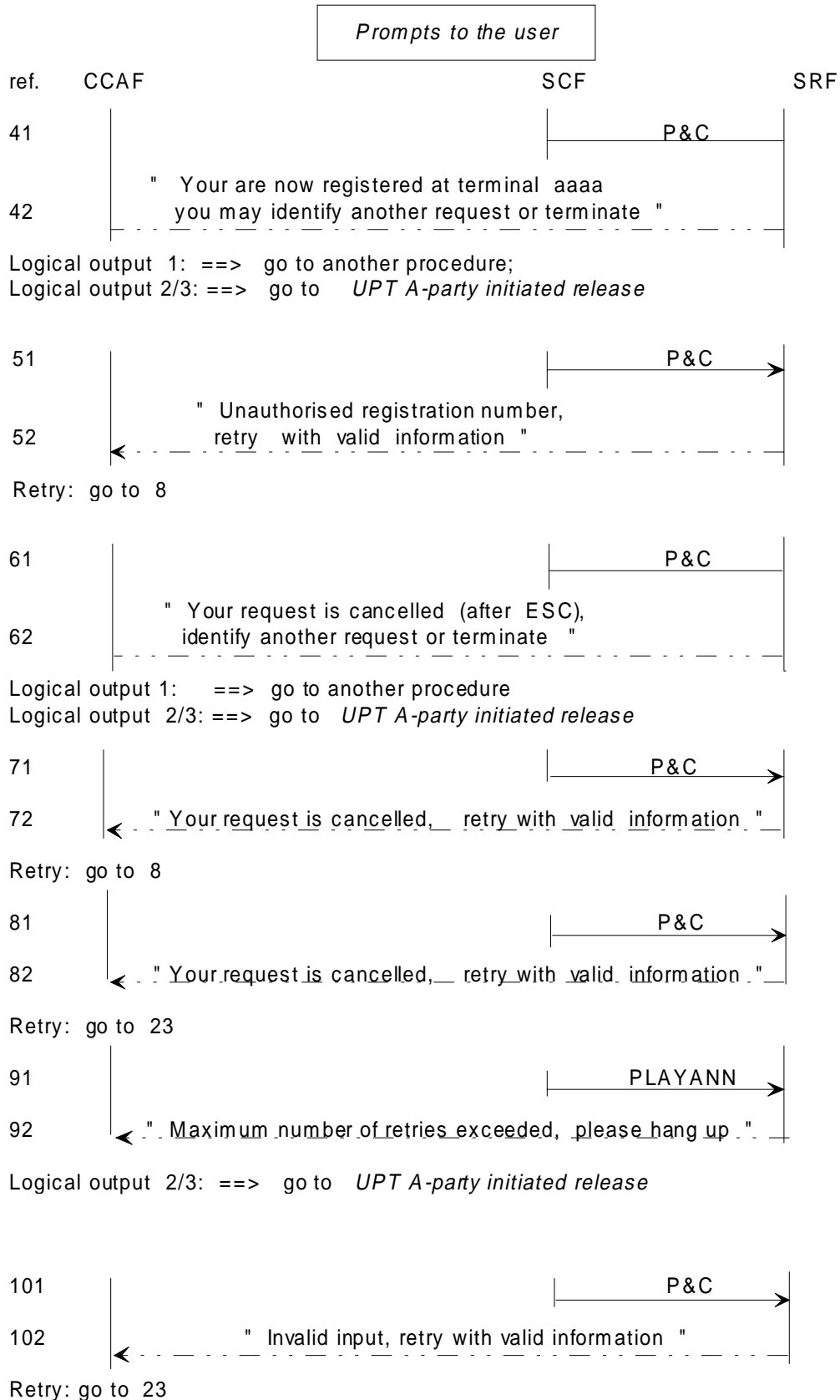


Figure A.5: Prompts to the user

### Notes on registration for outgoing UPT calls

IF ref.:

- 1-5 When CLI is available in the network the user has to first confirm whether registration will be at that terminal or not. If "yes", or in case of Escape, the "FurnishChargingInformation" is sent to instruct SSF to update the record. If "no" the procedure is the same as when no CLI is provided.
- 6-9 The user is prompted to enter terminal number. This can be given in different ways, depending on network capabilities. For example, a subscriber number in national or E.164 for international number.
- Usually a country code and a subscriber number are required (only the country code of the home country or of the visited country are allowed).
- A flag (#) may be used to indicate end of terminal identity.
- 10-13 The given terminal number is echoed and the user is requested to confirm (or reject). The SRF sends the response to the SCF.
- According to user input, terminal identification may be repeated or abandoned.
- 14 The "FurnishChargingInformation" is sent to instruct SSF to update the record.
- 15-16 The SDFo is queried to check if any restrictions apply to the use of the given terminal number.
- If the registration is denied a negative reply is sent to the SCF.
- 17 See 14.
- 21-22 The user is offered to enter a sequence of information to limit/restrict the registration.
- 23-28 The sequence contains a code (C) which indicates the nature of the limitation e.g. period of time, date, default limitation stored in the service profile or no limitation. The necessary parameters are given in a following block (XXXX). A separator \* is dialed between the two blocks.
- The sequence is echoed to the user for confirmation.
- According to the user input, the limitation sequence may be repeated (sequence (71,72 and 23-28) or abandoned (ESC)).
- NOTE: The originating network makes only a format check on the received sequence.
- 29-35 The SDFhA is queried to check if the given terminal number does not violate any restriction and is updated with the new location. If the registration is denied, a negative reply is sent to the SCF. A waiting prompt is given to the user. The service profile is updated with the location data given by the UPT user.
- 36-37: The SCF indicates in the SDFo that the calling line is "reserved" for UPT outgoing calls for the requesting UPT user, identified by his PUI. This implies the storage of CLI and PUI of the registering UPT user in the SDFo. For solution c), the PUI may not be stored in the SDFo at registration. However, the SCF will need the UPT identity in order to process outgoing UPT call. As a consequence in that case, this identity will be requested from the user when asking for outgoing call.
- 38 See 14.
- 41-42 When registration is completed successfully, the user may want another UPT feature. For this purpose the user may identify another feature request (follow-on).
- 51-52 The SRF prompts the user that registration was rejected, another valid terminal identity could be input again.
- 61-62 When the user cancels the request, another feature request may be input (follow-on).
- 71-72 After a negative acknowledgement, the SRF prompts the user that terminal number could be input again.
- 81-82 After a negative acknowledgement, the SRF prompts the user that limitation sequence could be input again.
- 91-92 The SRF prompts the user that the maximum number of rejected requests is reached. The count of the number of attempts is done in the SCF. The user is asked to hang up.

101,102 The SRF prompts the user that registration was rejected, another valid terminal identity could be input again.

## A.2.2 Deregistration for UPT outgoing calls

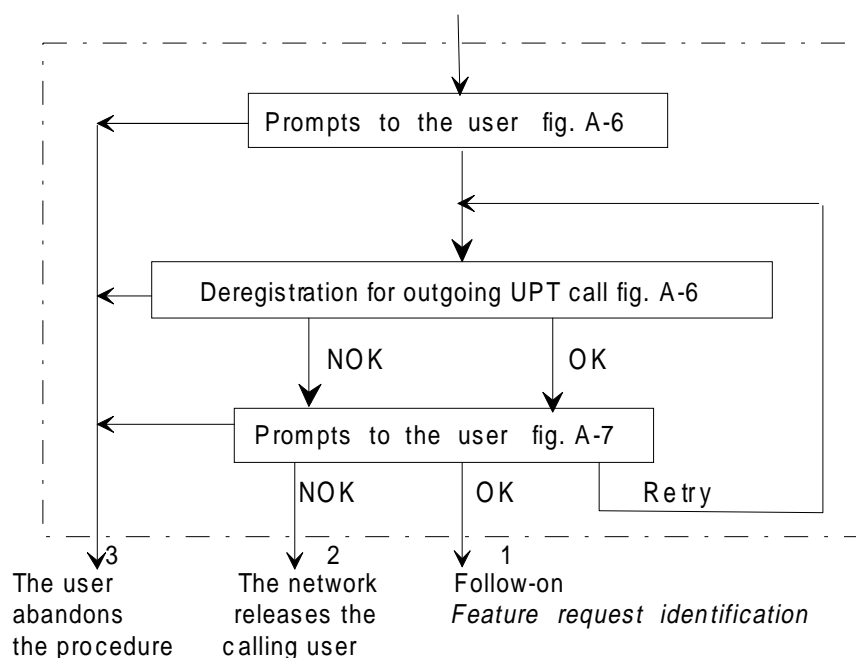
NOTE: We describe hereafter a call related procedure. However, as for registration for incoming calls, a call unrelated description could be adapted.

Deregistration for outgoing calls is similar to deregistration for incoming calls. We describe hereafter a call related procedure description, taking into account the impacts of scenario c) that can occur for a UPT user who wants to do an outgoing call from a line where he registered.

Prerequisite sequences:

- Access, identification and authentication.
- Feature request identification.

The organization of the deregistration sequence is given in the block diagram in the figure A.6:



**Figure A.6: Deregistration for outgoing calls**

Prompts are given to the user according to allowed service options.

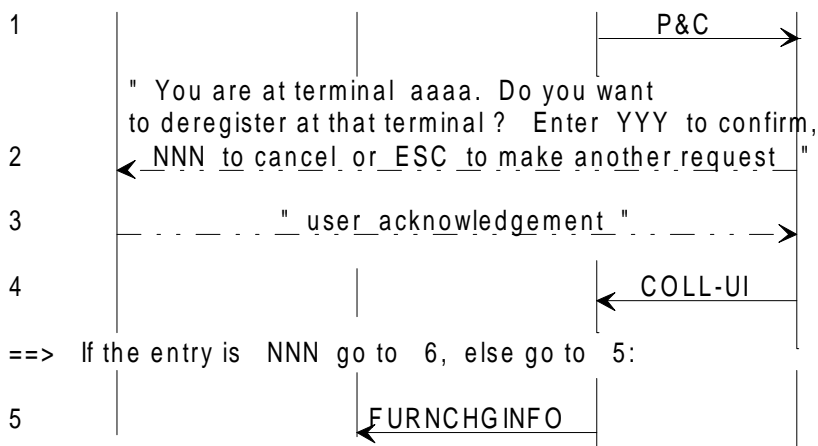
The logical outputs of the procedure are:

- 1) OK: the user is allowed to request another feature (follow-on);
- 2) NOK: the user is released by the network after a prompt (to prevent the service/network from being misused, e.g. abnormal number of retries after a request rejection, the network may release the user). This function is carried out in the SCF;
- 3) the user abandons the request (in any state).

*Prompts and deregistration for outgoing UPT call*

----- originating network ----->  
 ref. CCAF                    CCF/SSF                    SCF                    SRF

1) In a network with automatic Calling Line Identification:

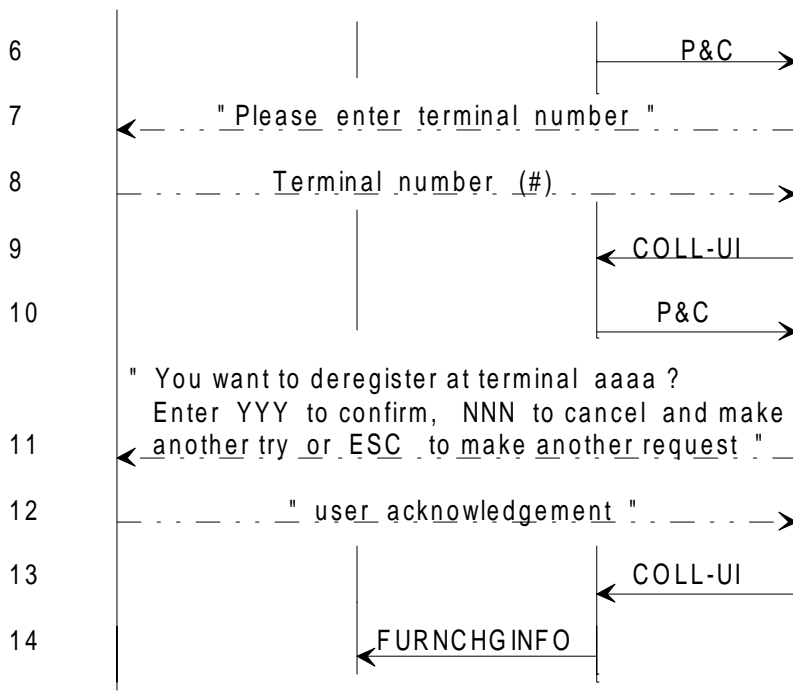


==> If the entry is NNN go to 6, else go to 5:

==> If the entry is YYY go to 15, if the entry is ESC go to 31.

==> If the maximum number of cancelled attempts is reached go to 51.

2) In a network with no Calling Line Identification:



==> If the entry is YYY go to 15,

==> If the entry is NNN go to 41,

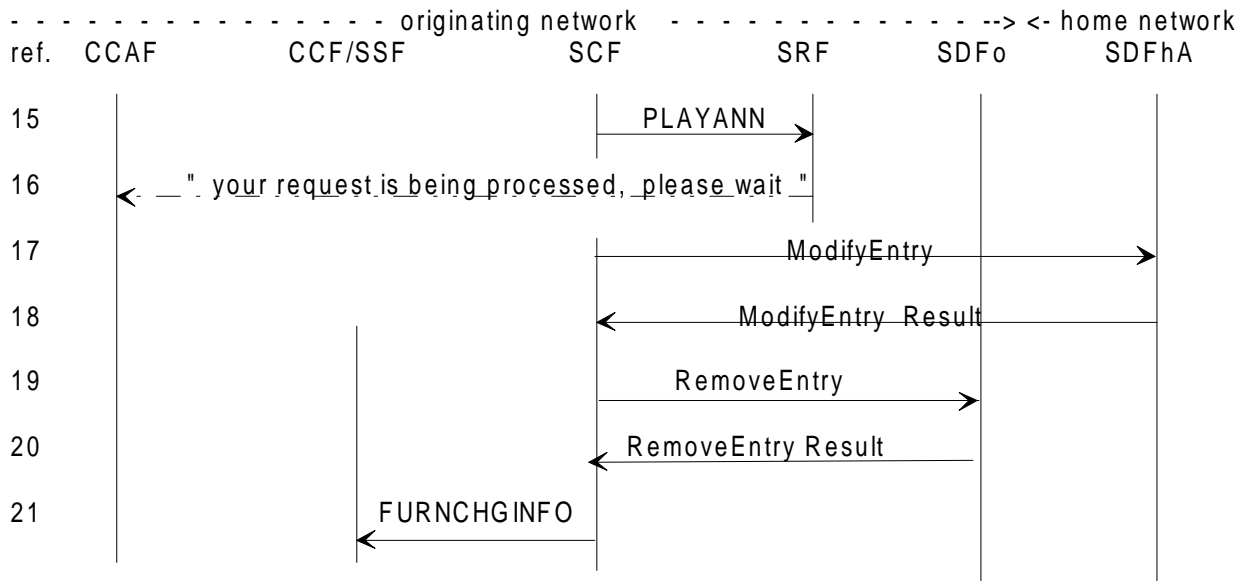
==> If the entry is ESC go to 31,

==> If the maximum number of cancelled attempts is reached go to 51.

**Figure A.7 (sheet 1 of 2): Prompts and deregistration for outgoing calls**



Deregistration for outgoing UPT calls

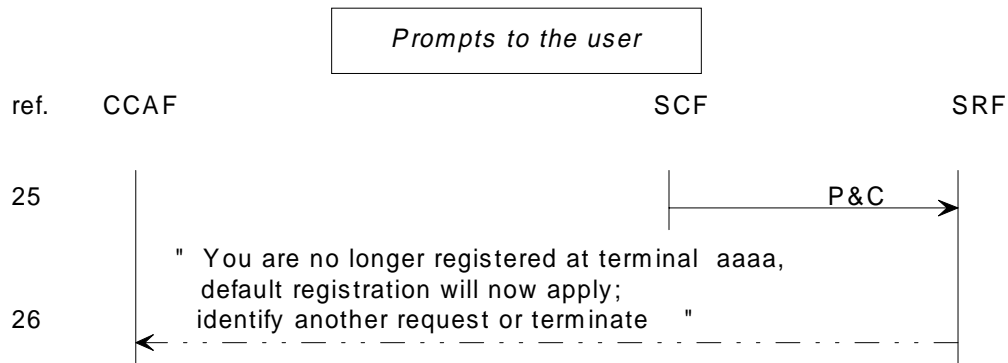


==> If deregistration is successful go to 25

==> If the maximum number of rejected attempts is reached go to 51

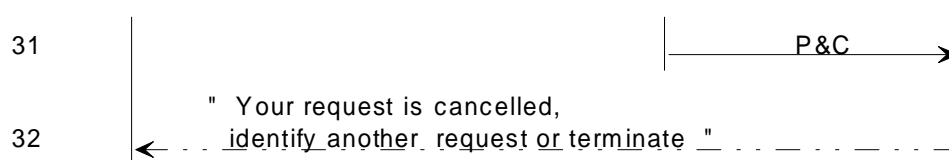
==> else go to 41

**Figure A.7 (sheet 2 of 2): Prompts and deregistration for outgoing calls**

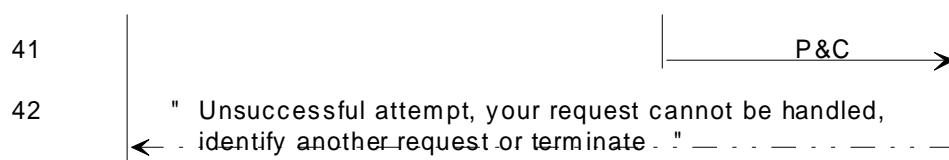


Logical output 1: ==> go to relevant procedure,  
 Logical output 2/3: ==> go to *UPT A-party initiated release*

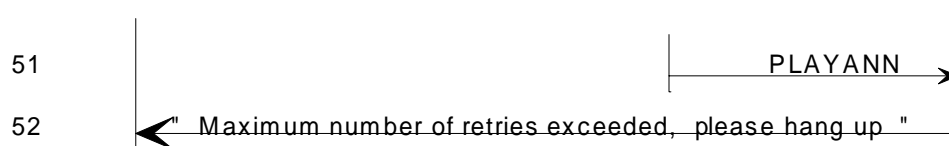
Cancelled or denied request



Logical output 1: ==> go to another procedure  
 Logical output 2/3: ==> go to *UPT A-party initiated release*



Logical output 1: ==> go to another procedure  
 Logical output 2/3: ==> go to *UPT A-party initiated release*



logical output 2/3: ==> go to *UPT A-party initiated release*

**Figure A.8: Prompts to the user**

### Notes on deregistration for outgoing calls

IF ref.:

- 1,2 The data retrieval may be necessary to obtain the current registration of the user (to prompt the user accurately).
- 3-6 The user is prompted to confirm or cancel deregistration. User acknowledgement is received in the SCF.
- 7 The "FurnishChargingInformation" operation is sent to instruct SSF to update the record.
- 8-11 When the user validates the deregistration, the SDFhA is updated. A waiting prompt is given to the user.
- 12 See 7.

- 17-18 The service profile is updated by the SCF according to the deregistration request.
- 19-20 The SCF removes from the SDFo the "reservation" made in case of **solution c) for outgoing call by a registered user**.
- 25, 26 SRF is ordered to give the user a positive acknowledgement. When deregistration is completed successfully, the user may want another UPT service (e.g. an outgoing call). For this purpose the user may make a new feature request.
- 31, 32 When deregistration is not confirmed by the user the user is requested to hang up or to make another feature request.
- 41, 42 When deregistration is not accepted by the home network for any reason e.g. no prior registration (if this has not been checked during *Feature request identification*), the user is requested to hang up or to make another feature request.
- 51, 52 The SRF prompts the user that the maximum number of rejected requests is reached. The count of the number of attempts is done in the SCF. The user is asked to hang up.

## A.3 UPT call handling procedures

### A.3.1 Outgoing UPT call for a non-registered UPT user

See [4].

### A.3.2 Outgoing UPT call for a registered UPT user - scenario c)

When the UPT user registered for outgoing calls, an indication was stored in the visited SDFo. This means that any call from this terminal will be charged to the registered UPT user.

The description of an outgoing call for a registered UPT user will be similar to the outgoing call of a non-registered UPT user but without authentication.

#### A.3.2.1 Outline description

The following is a high-level description of the actions required for the network to set up an outgoing UPT call when registration previously occurred.

The prerequisite sequences for phase 1 outgoing UPT calls are no longer needed because of the specificities of the three access scenarios. We do not describe the optional (weak at least) authentication that could be added (optional feature).

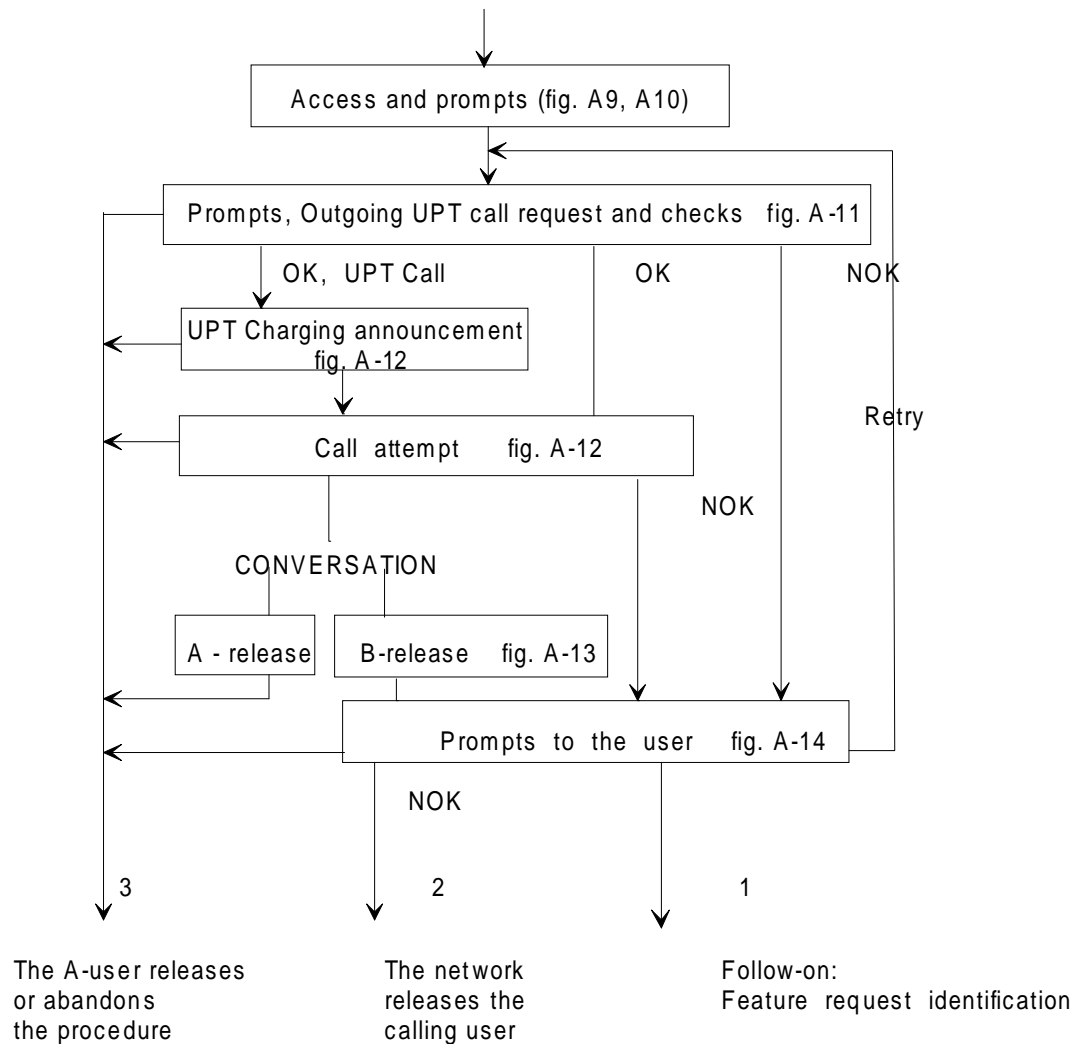
- 1) authorize destination number (optional, interaction with SDFhA);
- 2) if number is a UPT number, translate it to the called UPT user's current InCall location;
- 3) Disconnect SRF;
- 4) arm A-disconnect and B-disconnect trigger (DP 9) (twice) and triggers to detect call set-up failure (DPs 4, 5, 6); also arm DP 8 to detect mid-call feature activation (if required) and activate application timer on "B-party no answer" (if required);
- 5) "Furnish Charging Information" operation (or other charging operation);
- 6) "Call Information Request" operation (if transfer of call data to SDF at end of call);
- 7) connect to destination number using "Connect" operation.

### A.3.2.2 Information flow diagrams

This is a call from a UPT user possibly roaming but registered in the network from where he/she is calling. The called number may be any number. Of course, charging is a national or operator matter.

NOTE: The information flows related to supplementary services (Call Forwarding, ...) are not to be used for the time being, since these supplementary services are not clearly defined yet.

No prerequisite sequences.



**Figure A.9: Outgoing UPT call when registered**

Prompts are given to the user according to allowed service options.

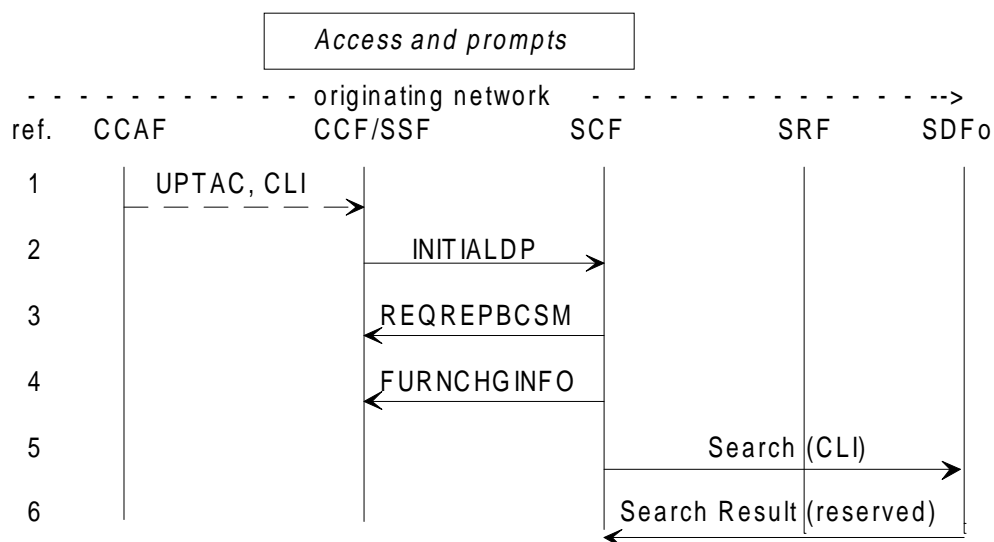
The logical outputs of the procedure are:

- 1) the user is allowed to request another feature (follow-on);
- 2) the user is released by the network after a prompt;
- 3) the user abandons the request before call set-up or hangs up during call set-up or conversation or while being prompted after call attempt.

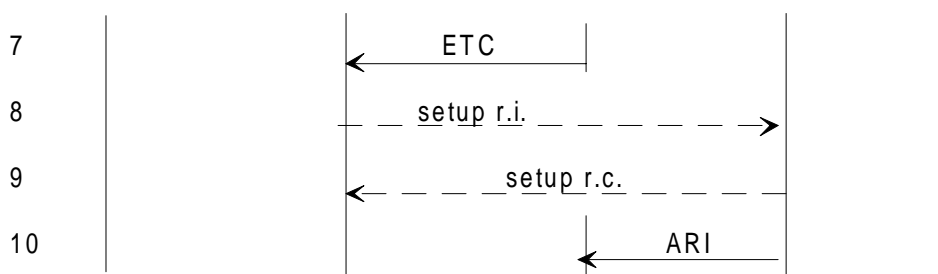
**A.3.2.2.1 Access to UPT for outgoing UPT call when registered in case of scenario c): the UPT user dials the UPTAC to indicate that the Outgoing call procedure has to be activated but PUI was NOT associated to the CLI in the SDFo at registration time**

In comparison with the phase 1 "Access, Identification and Authentication" description, the SCFo has to know for which UPT user the service is processed. Because no association is made between PUI and CLI in the SDFo, the UPT user is requested to provide his PUI.

Also, this type of scenario for outgoing UPT call when registered implies that a query to SDFo (in order to know if the line is "reserved") has to be done in ALL UPT phase 2 procedures. Two flows should be inserted in the shared "Access, Identification and Authentication" description from a terminal where no registration was made.

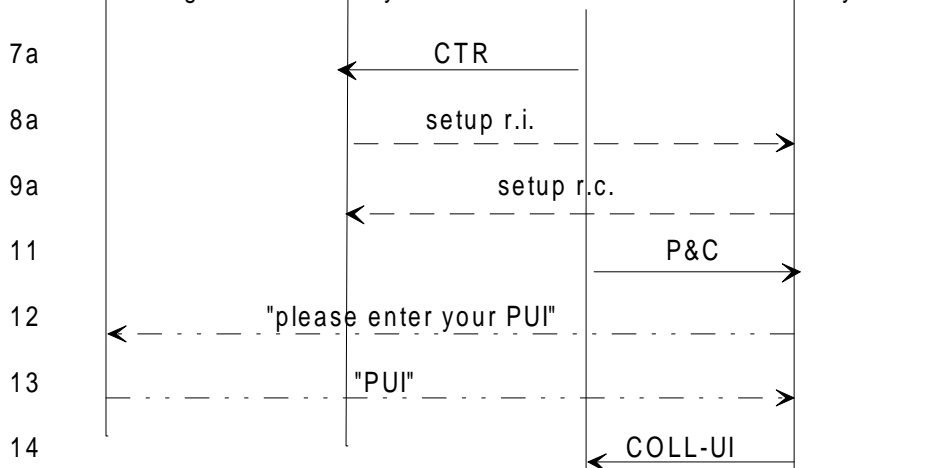


case i: IP directly connected to the SSP, operations not relayed by SSP



==> go to 11

case ii: IP integrated or directly attached to the SSP. The SSP relays the operations.



**Figure A.10: Access and prompts**

IF ref.:

- 1-2 The registered UPT user dials the UPTAC for outgoing UPT call when registered. The SSF triggers the SCF that does not process authentication. The outgoing call service logic is processed.
- 3 REQREPBCSM contains the list of events and their monitoring mode (may be useless if the DPs are statically armed).
- 4 The FURNCHGINFO operation is sent to instruct SSF to create a call record for the following user request.
- 5-6 The SCFo checks that the line is reserved for outgoing calls.

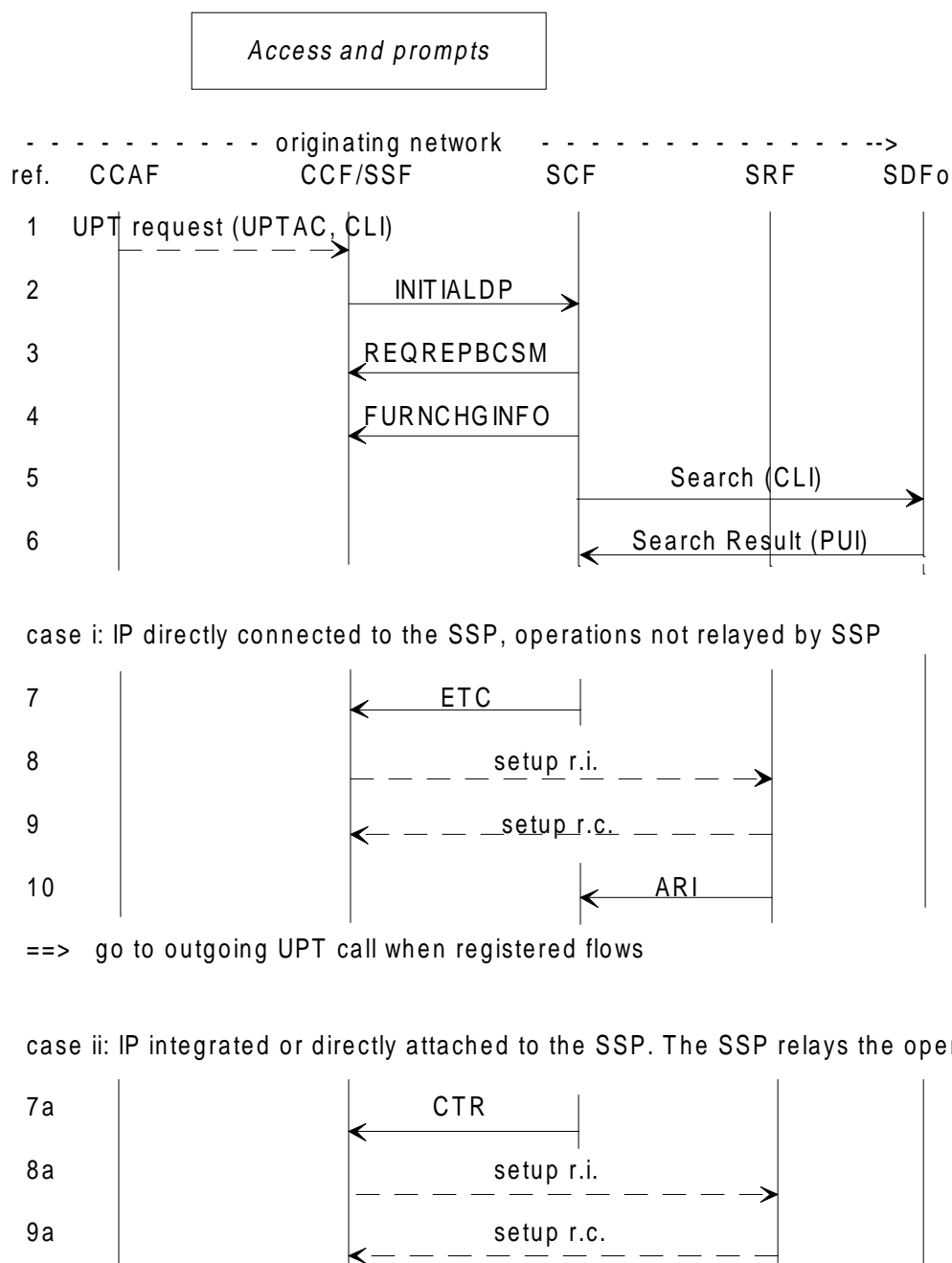
- 7-10 The SSF is ordered to connect an SRF using the ETC operation.  
The ARI operation is used (SCF-SRF operations not relayed by SSF).
- 7a-9a The SSF is ordered to connect an SRF using CTR.  
In this case the SCF-SRF operations are relayed by the SSF.
- 11-14 The UPT user is requested to provide his PUI, else the SCF is unable to process UPT (queries to the SDFh, charging, etc.).

Then go to A.3.2.2.3.

#### A.3.2.2.2 Access to UPT for outgoing UPT call when registered in case of scenario c): the UPT user the UPTAC to indicate that the Outgoing call procedure has to be activated but PUI and CLI were associated in the SDFo at registration time

The SCFo retrieves the PUI of the calling UPT party, thanks to the association in the SDFo.

Also, this type of scenario for outgoing UPT call when registered implies that a query to SDFo (in order to know if the line is "reserved") has to be done in ALL UPT phase 2 procedures. Two flows should be inserted in the shared "Access, Identification and Authentication" from a terminal where no registration was made.



**Figure A.11: Access and prompts**

IF ref.:

- 1-2 The UPT user dials the UPTAC. The SSF triggers the SCF.
- 3 REQREPBCSM contains the list of events and their monitoring mode (may be useless if the DPs are statically armed).
- 4 The FURNCHGINFO operation is sent to instruct SSF to create a call record for the following user request.
- 5-6 The SCF queries the SDFo thanks to the provided CLI. In the same time, the PUI of the registered user is retrieved from the SDFo.
- 7-10 The SSF is ordered to connect an SRF using the ETC operation.  
The ARI operation is used (SCF-SRF operations not relayed by SSF).



7a-9a The SSF is ordered to connect an SRF using CTR.

In this case the SCF-SRF operations are relayed by the SSF.

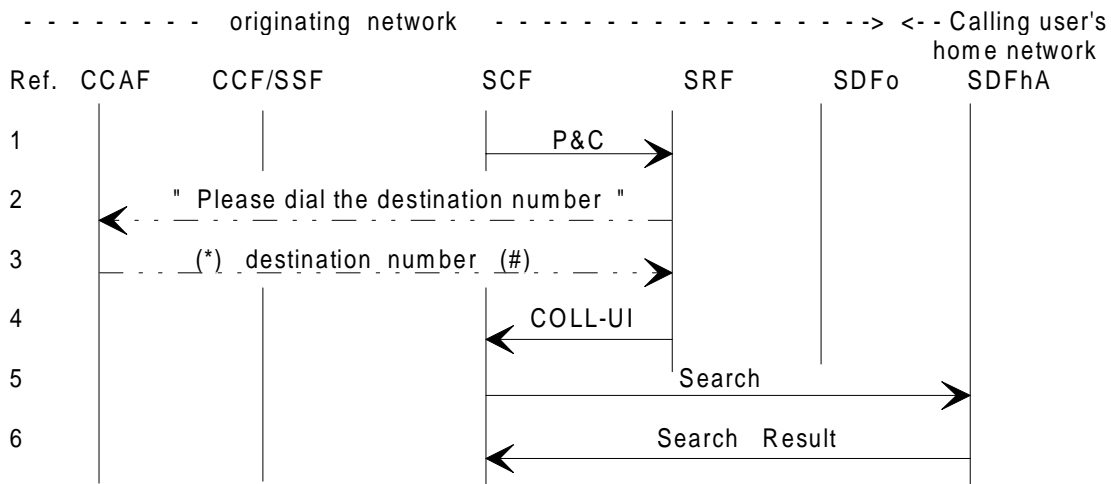
Then go to A.3.2.2.3.

### A.3.2.2.3 Outgoing call for a registered user (network side)

Before the following flows, the SCFt has to have recognized an UPT outgoing call request (because of an armed trigger in the SSF or after treatment on the access code used by the UPT calling party) and retrieved the PUI of the calling user (in the SDFo or the SDFh if not stored in SDFo at registration).

Access has just occurred.

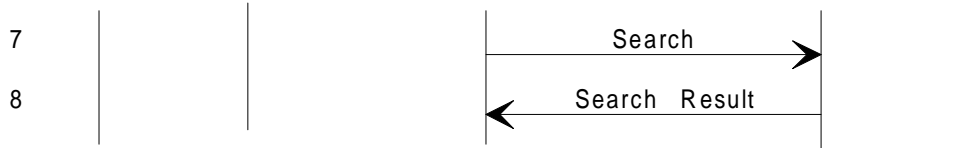
Prompts, Outgoing UPT call request and checks



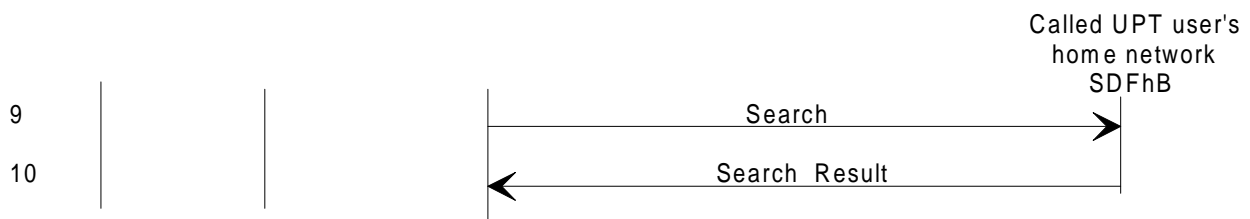
==> If the call request is rejected go to 81  
 ==> else if the B-number is: - a UPT number: go to 7  
 - not recognized as a UPT number: go to 11

Note : not recognized means here:

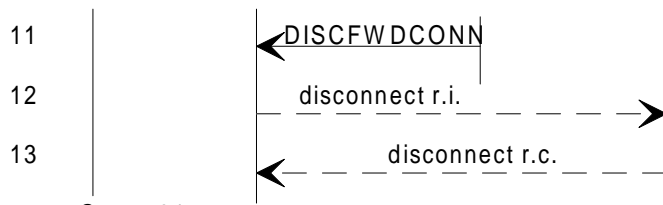
- the B-number is not a UPT number;
- the B-number is a UPT number but not understood as such by the SCF (e.g. if the UPT numbers are not internationally specified). The call will be routed over the B-user's home network; the B-user's location will be retrieved by the B-user's home network.



==> If the call request is rejected go to 81, else go to 9:

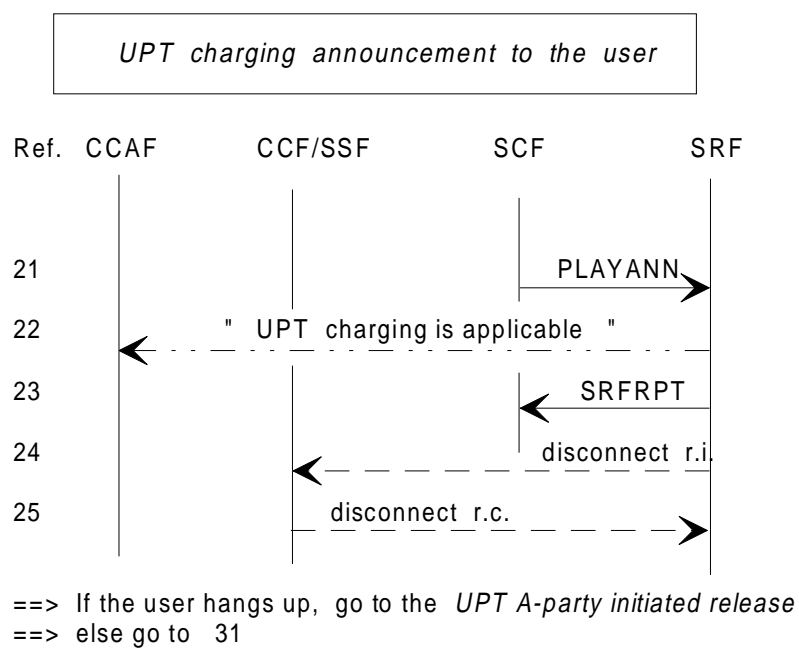


==> If the call request is rejected go to 81, else go to 21  
 ==> After 6, 8, and 10 if the maximum number of rejected attempts is reached go to 101

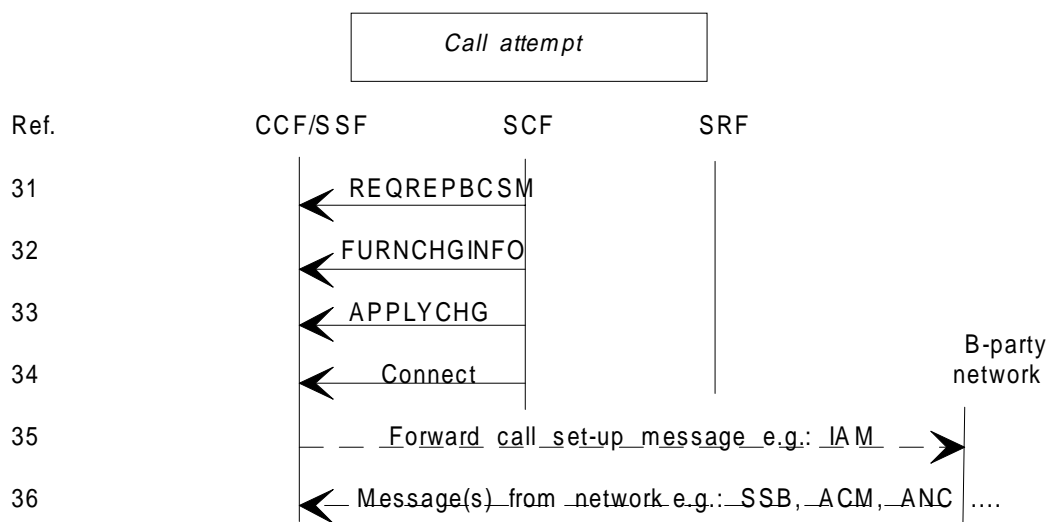


==> Go to 31

Figure A.12: Prompts, Outgoing UPT call request and checks



**Figure A.13: UPT charging announcement**



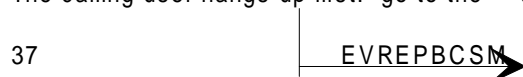
==> On busy, congestion or no-answer go to 37

==> When call set-up is successful:

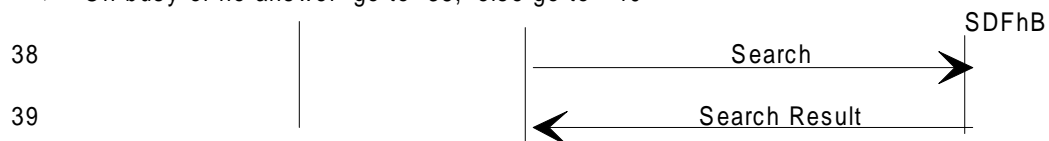
C O N V E R S A T I O N

The called user hangs up first: go to 51

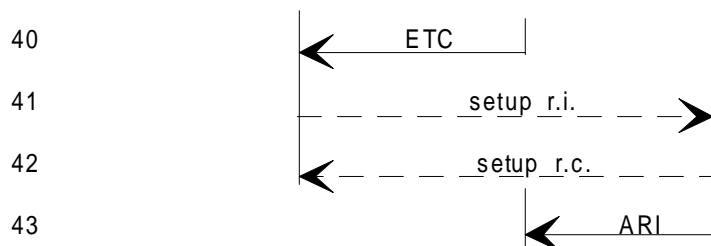
The calling user hangs up first: go to the *UPT A-party initiated release*



==> On busy or no-answer go to 38, else go to 40



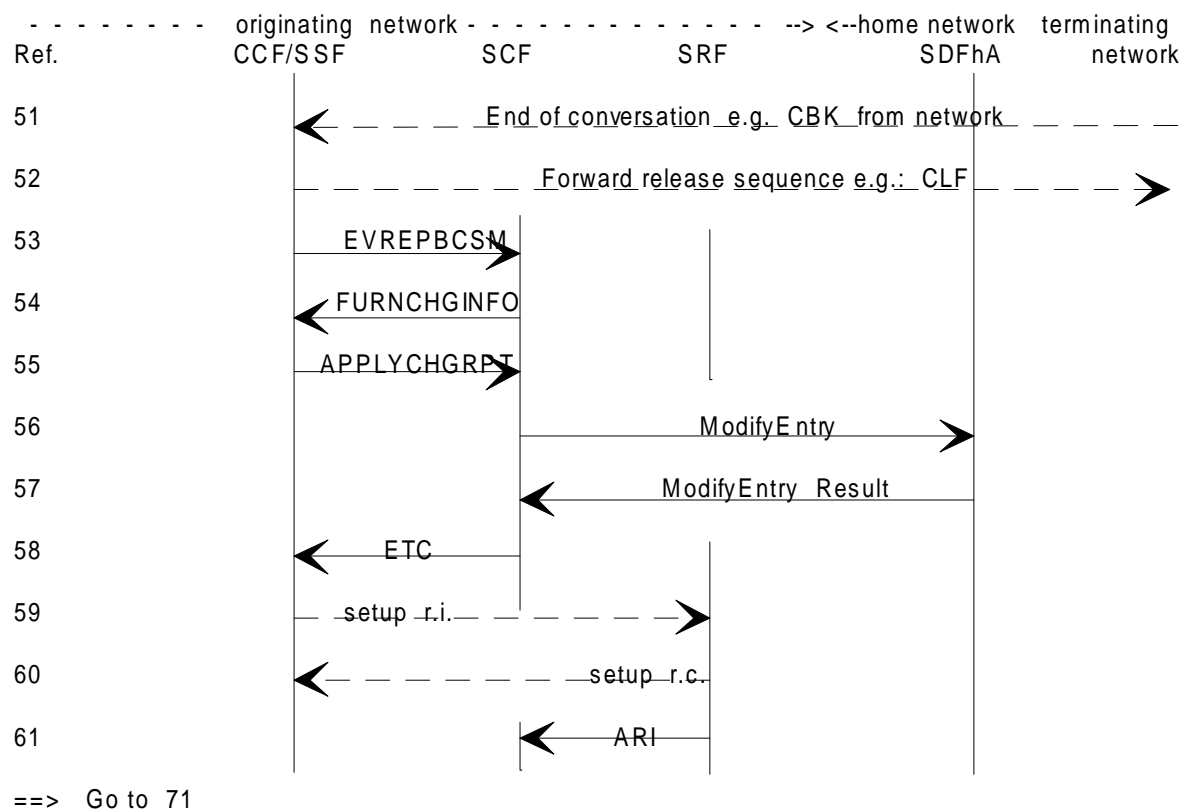
==> If call forwarding is activated, a redirected call attempt is made: go to 31, else go to 40



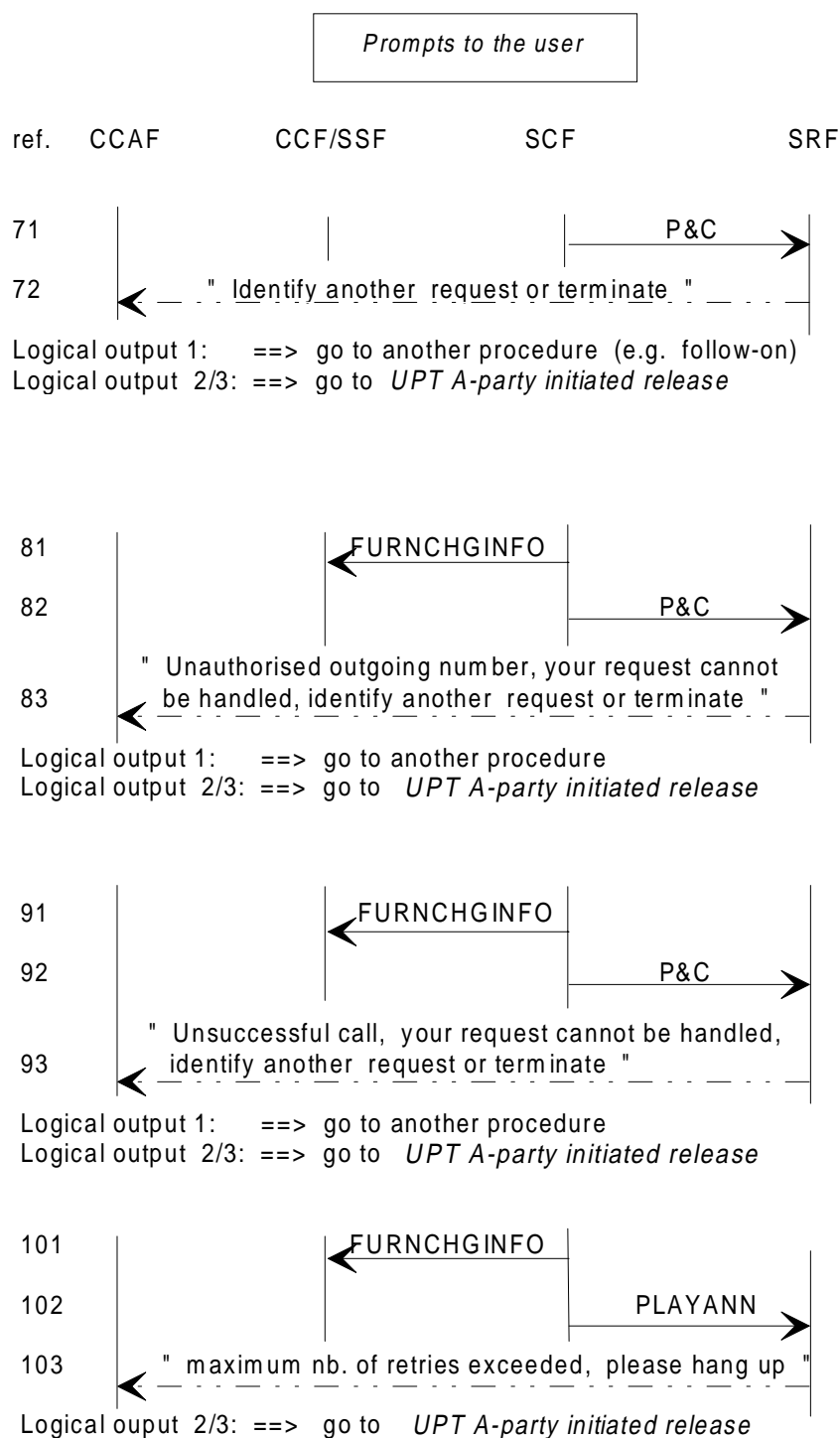
==> go to 91

**Figure A.14: Call attempt**

non-UPT B-party initiated release with follow-on



**Figure A.15: Non-UPT B-party release, with follow-on**



**Figure A.16: Prompts to the user**

Notes on *Outgoing UPT call when registration previously occurred*

IF ref.:

**Assumption:** the SCF recognizes UPT numbers and controls call set-up.

1-4 The B-number can be given in different ways, depending on networks. At most, the international significant number is required.

The dialled number can be any number, also a UPT number. The digits are echoed (the user can abandon the procedure by hanging up).

A flag (#) may be dialled to indicate the end of the destination number.

The SRF sends the number sequence to the SCF.

The B-number is analysed in the SCF.

- 5-6 The SDFhA is queried to check if particular restrictions apply to the dialled number.
- 7-8 SDFo is queried to check if there exist particular agreements between the local service provider and the called user's home provider for establishing outgoing UPT calls.
- 9-10 The SDFhB query is made to retrieve the location of the called user and the charging reference point.  
Particular restrictions may also be checked in SDFhB when necessary.
- 11-13 SSF is ordered to release the SRF.
- 21-22 The user is informed that particular charging conditions may apply.  
The user is thus given the opportunity to abandon the call.
- 23-25 When the announcement is played, disconnection of the SRF takes place (SRF initiated disconnection).
- 31 The SSF is required to suspend processing at given detection points (such as CBK after a successful call or on busy, congestion and no answer).
- 32 The "FurnishChargingInformation" operation is sent to instruct SSF to create a call record for the following call attempt.
- 33 "ApplyCharging" could also be sent (this operation is not necessary if an earlier request is pending).
- 34 The SSF is required to set up the call.
- 35-36 SSFo routes the call accordingly and receives backward signaling.  
If the B-party number is a (recognized) UPT number or not a UPT number, then the call is "normally" routed to the terminating CCAF.  
If the B-party number is a UPT number but not recognized, then the call is routed to the (UPT) B-party home network and, before alerting to the terminating CCAF, triggering occurs in order to retrieve the CCAF location and further routing (similar to flows 7, 8...).
- 37 When the call is unsuccessful, the SCF is informed. The no answer event is generated by an application timer in the SSF.
- 38-39 If a busy or no answer indication is received and if the called party is a UPT user, a request is made to the B-user's home data base to check whether the call forwarding service is activated.  
If call forwarding is activated, the redirection address is retrieved and a new call attempt is.
- 40-43 When the call set-up is unsuccessful or when the request is denied, it may be necessary to reconnect the SRF.  
Several SRF connection scenarios are possible.
- 51-53 The called party ends the conversation. SSF initiates an immediate disconnection sequence of the forward circuit. The disconnection sequence is network dependent.  
SSF reports to SCF.
- 54 The "FurnishChargingInformation" operation is sent to instruct SSF to update the record.
- NOTE: For the purpose of the follow-on, the creation of a new record is done when the user places a new request.
- 55-57 Since an "ApplyCharging" has been issued, the record is returned to the SCF.  
The record is sent to the SDFhA and, in case of UPT user to UPT user call, to the SDFhB.
- 58-61 To offer the follow-on, the SCF orders the SSF to reconnect an SRF.  
Several SRF connection scenarios are possible.

- 71-72 SRF is ordered to prompt the calling user, which is given the opportunity to place another service request.
- 81 See 54.
- 82-83 The calling user is informed that the dialed B-number is not authorized and is requested to hang up or to make another feature request.
- 91 See 54.
- 92-93 The calling user is informed that the call is unsuccessful and is requested to hang up or to make another feature request.
- 101 The "FurnishChargingInformation" operation is sent to instruct SSF to update the record.
- 102,103 The SRF prompts the user that the maximum number of denied call attempts is reached. The count is done in the SCF.  
The user is asked to hang up.



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## History

<b>Document history</b>		
V1.1.1	August 1998	Membership Approval Procedure      MV 9840:    1998-08-04 to 1998-10-02
V1.1.1	October 1998	Publication