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Technical Specification

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Customised Applications for Mobile network
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Service description;
Stage 1
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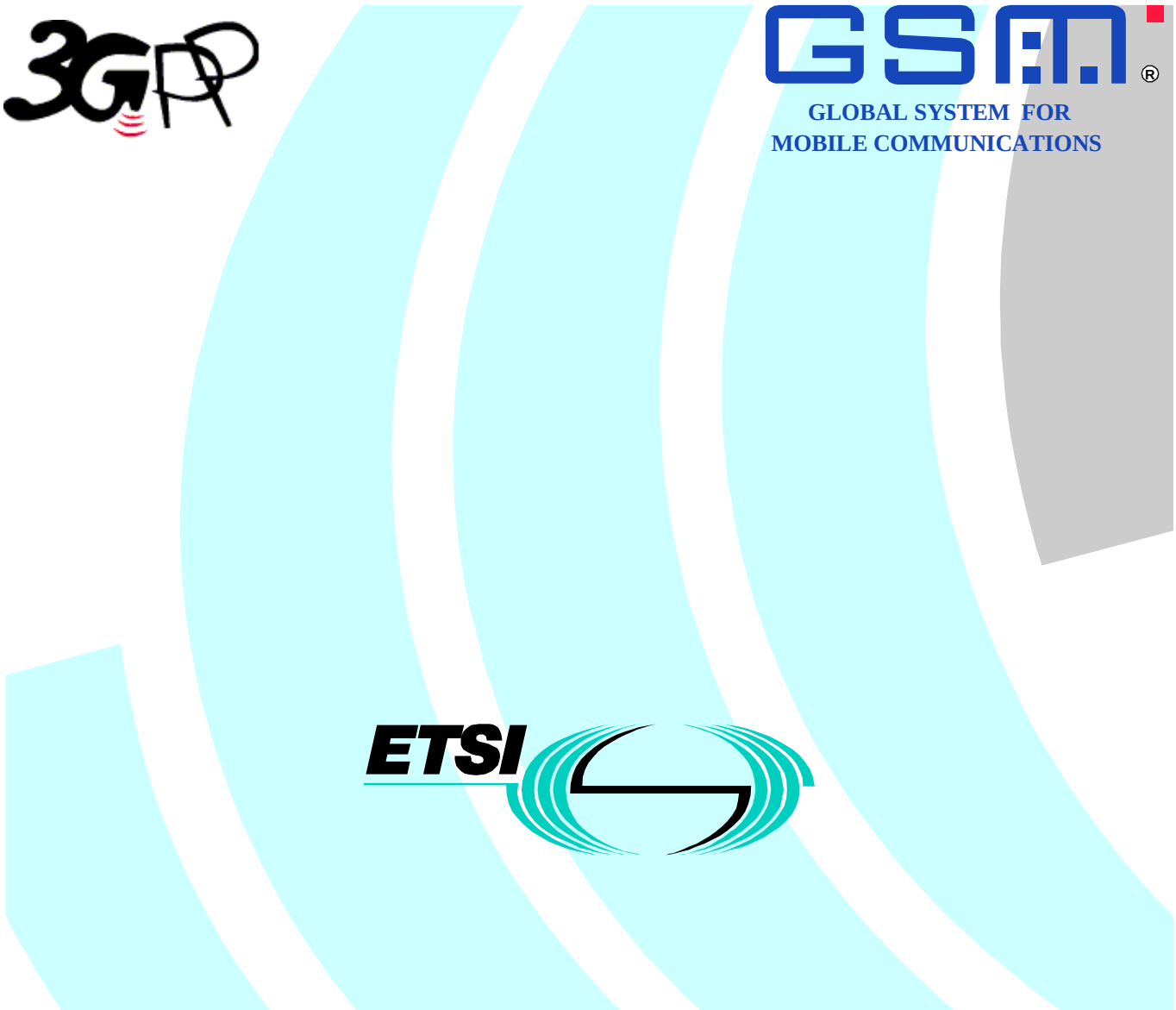

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Foreword

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The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under www.etsi.org/key .

Contents

Foreword

This Technical Specification has been produced by the 3GPP.

This TS defines the stage 1 description for the first phase of the CAMEL feature (Customised Applications for Mobile network Enhanced Logic) which provides the mechanisms to support services consistently independently of the serving network within the 3GPP system.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control;

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the specification;

Introduction

The present document includes references to features which are not part of the Phase 2+ Release 96 of the GSM Technical specifications. All subclauses which were changed as a result of these features contain a marker (see table below) relevant to the particular feature.

The following table lists all features that were introduced after Release 96.

Feature	Designator
CAMEL Phase 2	$(CAMEL2$) Release 97
CAMEL Phase 3	$(CAMEL3$) Release 99

1 Scope

This standard specifies the stage 1 description for the CAMEL feature (Customised Applications for Mobile network Enhanced Logic) which provides the mechanisms to support services consistently independently of the serving network. The CAMEL features shall facilitate service control of operator specific services external from the serving PLMN. The CAMEL feature is a network feature and not a supplementary service. It is a tool to help the network operator to provide the subscribers with the operator specific services even when roaming outside the HPLMN.

CAMEL is developed in phases. The following phases exist:

- CAMEL phase 1. This is the default phase in this specification. Text which isapplicable only to phase 1 is marked with the formal designator - $(CAMEL1$)
- CAMEL phase 2. Material which applies for CAMEL phase 2 and later phases is marked with the formal designation - $(CAMEL2$) for a single subclause or paragraph, and with the formal designation $(begin$(CAMEL2$) ... $(end$(CAMEL2$) for multiple paragraphs.
- CAMEL phase 3. Material which applies for CAMEL phase 3 and later phases is marked with the formal designation - $(CAMEL3$) for a single subclause or paragraph, and with the formal designation $(begin$(CAMEL3$) ... $(end$(CAMEL3$) for multiple paragraphs.

A VPLMN or IPLMN supporting CAMEL phase 2 shall also support CAMEL phase 1, so far as it is applicable to the network entities concerned. -$(CAMEL2$).

A VPLMN or IPLMN supporting CAMEL phase 3 shall also support CAMEL phase 2 and CAMEL phase 1, so far as it is applicable to the network entities concerned. For instance, an SGSN has no capability defined for CAMEL phase 2 or CAMEL phase 1. -$(CAMEL3$)

The CAMEL feature is applicable

- To mobile originated and mobile terminated call related activities;
- As a CAMEL phase 2 function, to supplementary service invocations - $(CAMEL2$);
- as a CAMEL Phase 3 function, to SMS MO, to GPRS sessions and PDP contexts, to the control of HLR subscriber data, to the control of network signalling load - $(CAMEL3$).

The mechanism described addresses especially the need for information exchange among the VPLMN, HPLMN and the CAMEL Service Environment (CSE) for support of such operator specific services. Any user procedures for operator specific services are outside the scope of this standard.

This specification describes the interactions between the functions of the VPLMN, HPLMN, IPLMN and the CSE.

The second phase of CAMEL enhances the capabilities of phase 1. The following capabilities are added:

- Additional event detection points;
- Interaction between a user and a service using announcements, voice prompting and information collection via in band interaction or USSD interaction;
- Control of call duration and transfer of Advice of Charge Information to the mobile station;
- The CSE can be informed about the invocation of the supplementary services ECT, CD and MPTY;
- For easier post-processing, charging information from a serving node can be integrated in normal call records.

The third phase of CAMEL enhances the capabilities of phase 2. The following capabilities are added:

- Support of facilities to avoid overload ;
- Capabilities to support Dialled Services;
- Capabilities to handle mobility events, such as (Not-)reachability and roaming;
- Control of GPRS sessions and PDP contexts;

- Control of mobile originating SMS through both circuit switched and packet switched serving network entities;
- Interworking with SoLSA (Support of Localised Service Area). Support for this interworking is optional;
- The CSE can be informed about the invocation of the GSM supplementary service CCBS.

Detailed information is given in the respective sections.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 22.093: "Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".

[2] 3GPP TS 22.079: "Support of Optimal Routeing (SOR); Service definition (Stage 1)".

[3] 3GPP TS 22.030: "Man-machine Interface (MMI) of the Mobile Station (MS) (Stage 1)".

[4] 3GPP TS 22.090: "Stage 1 Decision of Unstructured Supplementary Service Data (USSD)".

[5] 3GPP TS 22.097: "Multiple Subscriber Profile (MSP); Service definition (Stage 1)".

[6] 3GPP TS 22.060: "General Packed Radio Service (GPRS); Service definition (Stage 1)".

[7] 3GPP TS 22.057: "Mobile Station Execution Environment (MExE); Service definition (Stage 1)".

[8] 3GPP TS 22.071: "Location Services; Service Definition (Stage1) ".

[9] 3GPP TS 23.018: "Basic Call Handling; Technical Realization".

3 Definitions and abbreviations

Operator Specific Service (OSS): Any non-standardised service offered to a mobile user.

Interrogating PLMN (IPLMN): The PLMN which interrogates the HPLMN for information to handle a mobile terminating call.

CAMEL Service Environment (CSE): A CSE is a logical entity which processes activities related to Operator Specific Services (OSS).

Route select failure: A condition when routeing to the called party fails. Route Select Failure can be reported in an existing relationship - $(CAMEL2$) or a new relationship can be initiated. - $(CAMEL3$)

Service event: A specific event of a process which may be used as part of an operator specific service.

Initial service event: A service event which triggers the establishment of a relationship between the CSE and the controlled entity.

Subsequent service event: A service event which is reported in the context of an existing relationship between the CSE and the reporting entity.

Service procedure: A part of the CAMEL feature to be used when a specific CAMEL service event is detected.

Network CAMEL Service Information (N-CSI): Identifies services offered by the serving PLMN operator equally for all subscribers. - $(CAMEL3$)

NOTE: These services may also be provided using a technology other than CAMEL.

CAMEL Subscription Information (CSI): Identifies that CAMEL support is required for the subscriber and the identities of the CSEs to be used for that support. The CSI also contains information related to the OSS of the subscriber, e.g. Service Key.

The OSS may include both services provisioned for individual subscribers and services provisioned equally for all users of a VPLMN. - $(CAMEL3$)

Location Area Code: Indicates the global identity of that part of the service area of a VLR in which the subscriber is currently located, and in which the subscriber will be paged for mobile terminated traffic

Location Information: The location information shall be an identification of the location of the served subscriber.

The following location information shall be sent to the CSE (if available):

- **Geographical information** indicates the location (latitude and longitude) of the served subscriber. When Cell ID or Location Area Code is known the latitude and longitude may be calculated as the nominal central point of the cell or of the location area; alternative mechanisms for determining latitude and longitude may also be supported. The uncertainty of the indicated location is part of the geographical information.

- **Geodetic Information** provides the same functional capability as geographical information; however it is encoded differently.

- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used if the subscriber is using GSM radio access. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.

- **Routing Area ID** indicates the global identity of the current or last GPRS routing area which the subscriber is using or has used if the subscriber is using GSM radio access in a GPRS serving network.

- **Service Area ID** indicates the global identity of the current or last service area which the subscriber is using or has used if the subscriber is using UMTS radio access. The VPLMN shall update the stored Service Area ID at establishment of every radio connection and whenever the subscriber is handed over between service areas.

- **VLR number** is the number of the serving VLR stored in the HPLMN.

- **Location status** indicates whether or not the location information has been confirmed by radio contact. If the location information has not been confirmed by radio contact a time stamp is sent indicating the time elapsed since the last radio contact with the subscriber.

- **Location number** is the number received on the incoming circuit (for an incoming call) or to be sent on the outgoing circuit (for an outgoing call).

Service Key: An identifier of the OSS which shall be transparent to the IPLMN/VPLMN.

Subscriber Status: An indication of the status of a subscriber, determined by the state of the subscriber's MS. The subscriber status can take one of three values:

- **CAMEL-busy**: The MS is engaged in a mobile-originated or mobile-terminated circuit-switched call.

- **Network determined not reachable**: The network can determine from its internal data that the MS is not reachable. This includes detached and purged mobile stations.

- **Assumed idle**: The MS is not CAMEL-busy or network determined not reachable.

GPRS session: The period during which the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network. - $(CAMEL3$)

PDP Context: A transaction for the exchange of data between an MS and a peer entity, which is addressed by the Access Point Name. A PDP context starts when the request from a GPRS subscriber successfully establishes the PDP context and ends when the subscriber deactivates the PDP context. - $(CAMEL3$)

PDP: Packet Data Protocol (as defined in TS 22.060 [6]) - $(CAMEL3$)

Carrier Identification Code: Identifies uniquely the Carrier (NAEA). - $(CAMEL2$)

Carrier Selection Information: An indication of whether the subscriber selected a carrier, or the carrier is predefined for the subscriber (NAEA). - $(CAMEL2$)

Originating Line Identification: Identifies uniquely the subscriber to be charged for the usage of the carrier (NAEA). - $(CAMEL2$)

Charge Number: Identifies uniquely the organisation to be charged for the usage of the carrier (NAEA). - $(CAMEL2$)

North American Equal Access (NAEA): A service used in the North American region whereby a subscriber may select the carrier to be used for long distance calls. - $(CAMEL2$)

Subscribed Dialled Services: Identifies a set of at most ten service numbers. The served subscriber can originate calls by entering a service number for the destination. This is in addition to the possibility to route calls by entering the destination number. Each service number is defined at the HPLMN operator's discretion. The set of service numbers forms part of the subscriber's profile, whether she is registered in the HPLMN or another PLMN. - $(CAMEL3$)

4 Description

The CAMEL network feature enables the use of Operator Specific Services (OSS) by a subscriber even when roaming outside the HPLMN.

4.1 Provision of CAMEL

CAMEL subscribers have one or more CAMEL Subscription Information (CSI) elements. CAMEL Subscription Information is provided by the HPLMN operator by administrative means.

The following CSIs may be administered per subscriber:

D-CSI $(CAMEL3$) *Dialled Services CAMEL Subscription Information* (D-CSI) is transferred to the VPLMN (at location update) and IPLMN (for an incoming call in GMSC). D-CSI contains trigger information which is required to invoke a CAMEL service logic for subscribers dialled services.
See section 5.3.2 for the usage of D-CSI.

GPRS-CSI $(CAMEL3$) *GPRS CAMEL Subscription Information (GPRS-CSI)* is transferred to the VPLMN. GPRS-CSI contains trigger information which is required to invoke a CAMEL Service Logic for GPRS Sessions and PDP Contexts.
See section 10 for the usage of GPRS-CSI.

M-CSI $(CAMEL3$) *Mobility Management CAMEL Subscription Information (M-CSI)* is transferred to the VPLMN. M-CSI is used to notify the CSE about Mobility Management events.
See section 12.1 for the usage of M-CSI.

O-CSI *Originating CAMEL Subscription Information (O-CSI)* is transferred to the VPLMN (at location update) and to the IPLMN (for an incoming call in the GMSC). O-CSI contains trigger information which is required to invoke a CAMEL Service Logic for Mobile Originating calls (in the VMSC) and Mobile Forwarding calls (in the VMSC and the GMSC).
See section 5 for the usage of O-CSI.

SMS-CSI $(CAMEL3$) *Short Message Service CAMEL Subscription Information (SMS-CSI)* is transferred to the VPLMN. SMS-CSI contains trigger information which is required to invoke a CAMEL Service Logic for Mobile Originating Short Message submissions.
See section 9 for the usage of SMS-CSI.

SS-CSI $(CAMEL2$) *Supplementary Service Invocation Notification CAMEL Subscription Information (SS-CSI)* is transferred to the VPLMN. SS-CSI is used to notify the CSE about the invocation of certain Supplementary Services.
See section 12.3 for the usage of SS-CSI.

T-CSI *Terminating CAMEL Subscription Information (T-CSI)* is transferred to the IPLMN for an incoming call in the GMSC. T-CSI contains trigger information which is required to invoke a CAMEL Service Logic for Mobile Terminating calls in the GMSC.
See section 6 for the usage of T-CSI.

TIF-CSI $(CAMEL2$) *Translation information Flag CAMEL Subscription Information (TIF-CSI)* is transferred to the VPLMN. TIF-CSI is used in the HLR for registering short Forwarded-to-Numbers (FTNs). When TIF-CSI is present, the subscriber is allowed to register short FTNs.
When the subscriber invokes Call Deflection, TIF-CSI in the VPLMN allows the subscriber to deflect to short Deflected-to-Numbers.
See section 18.3 for the usage of TIF-CSI.

U-CSI $(CAMEL2$) *USSD CAMEL Subscription Information (U-CSI)* is held in the HLR; it is not sent to any other node. U-CSI contains trigger information which is used to invoke a USSD application in the CSE for the served subscriber.
See section 14.3 for the usage of U-CSI.

UG-CSI $(CAMEL2$) *USSD General CAMEL Subscription Information (UG-CSI)* is held in the HLR; it is not sent to any other node. UG-CSI contains trigger information which is used to invoke a USSD application in the CSE for all subscribers.
See section 14.3 for the usage of UG-CSI.

VT-CSI $(CAMEL3$) VMSC *Terminating CAMEL Subscription Information (VT-CSI)* is transferred to the VPLMN at location update. VT-CSI contains trigger information which is required to invoke a CAMEL Service Logic for Mobile Terminating calls in the VMSC.
See section 6 for the usage of VT-CSI.

Refer to 3G TS 23.078 for detailed descriptions of the various types of CAMEL Subscription Information.

The CSI may includethe Default Call Handling, Default GPRS Handling or Default SMS Handling.

The Default Call Handlingindicates whether the call shall be released or continued if the contact with the CSE is not confirmed or is interrupted.

Network -based services may be provided by the serving PLMN operator. The provisioning mechanism is out of the scope of this specification. -$(CAMEL3$)

4.2 General Procedures

Each process is made up of a series of telecommunication events, some of which are service events. At a service event, the IPLMN or VPLMN may:

- Suspend the handling of the telecommunication service and make contact with a CSE to ask for instructions, or
- Send a notification to the CSE and continue the handling of the telecommunication service, or
- Continue the handling of the telecommunication service without sending a notification to the CSE.

When a service event is reported to the CSE, the IPLMN or VPLMN shall send to the CSE the information listed in this specification. All information sent to the CSE relates to the served CAMEL subscriber unless otherwise stated. The initial service events, which can initiate contact with the CSE, are defined in the CAMEL Subscription Information. The CSE identity which corresponds to each initial service event is also defined in the CAMEL Subscription Information.

The serving network shall accept the instruction from the CSE and continue call processing with the received information.

The CAMEL feature is applicable in a PLMN when the CAMEL subscription information is handled properly and when the communication to the CSE is compliant with the CAMEL protocol [8].

The CAMEL network capabilities are used at a PLMN when the CAMEL feature is applicable and:

- The CSI is received from the HPLMN; or
- The CSE requests congestion control in the VPLMN or IPLMN. - $(CAMEL3$)

In addition dialled network-based services may be applicable in a PLMN if so administered. - $(CAMEL3$)

The CSE shall be capable of responding to the CAMEL request with instructions on how to resume the suspended process. In the case of subscriber-based services the CSE shall be able to instruct the IPLMN or VPLMN to:

- Activate subsequent service events to be reported to the CSE. These events shall remain active only for the lifetime of the telecommunication service;
- Alter information relating to the suspended process;
- Alter information relating to the parties involved in the process;
- Indicate which of the possible parts of the process should occur next (e.g. terminate the call);
- Perform Charging activities; - $(CAMEL2$)
- Order in band user interaction. - $(CAMEL2$)

$(begin$(CAMEL3$)

For subscribed dialled services it shall be possible for the CSE to instruct the serving PLMN to perform either or both of the following actions:

- Perform Charging activities;
- Order in band user interaction.

After the CSE has issued either or both of the preceding instructions, it shall issue exactly one of the following instructions to the serving PLMN:

- Continue the processing of the call, or
- Continue the processing of the call with modified information, or
- Connect the calling party to a specified called party, or
- Release the call.

After one of the above instructions, the relation between the serving network and the CSE shall be released. Any other behaviour may cause misoperation of CAMEL based services.

Serving network-based service numbers may be treated after the behaviour described above. These services are outside the scope of the CAMEL specification.

Serving network based service numbers may be provided at the discretion of the network operator but these are outside the scope of this specification.

$(end$(CAMEL3$)

CAMEL features shall form an integral part of the following processes:

- Mobile Originated call (MO call);
- Mobile Terminated call (MT call) in the GMSC;
- Mobile Terminated call (MT call) in the VMSC; - $(CAMEL3$);
- Mobile Forwarded call (MF call) - early call forwarding; early forwarded calls are treated as MO calls;
- Mobile Forwarded call (MF call) - late call forwarding; late forwarded calls are treated as MO calls;
- Supplementary service invocation; - $(CAMEL2$)
- USSD user interaction. The of service codes for CAMEL services can be allocated per subscriber or globally for all subscribers of the HPLMN; - $(CAMEL2$)
- Mobile Originated Short Message (MO SM) service; via both the MSC and the SGSN; - $(CAMEL3$)

- General Packet Radio Service (GPRS); - $(CAMEL3$)
- Mobility Management events $(CAMEL3$)
- Interrogation and control of Subscription Data; - $(CAMEL3$)

The CSE shall be able to interrogate the HPLMN for information about the location and status of a particular subscriber at any time.

4.3 Applicability of CAMEL Procedures

CAMEL procedures are applicable to all circuit switched Basic Services without distinction (except Emergency calls).

CAMEL procedures are applicable to GPRS sessions and PDP contexts. - $(CAMEL3$)

CAMEL procedures are applicable to the Mobile Originating Short Message Service through both circuit switched and packet switched serving network entities. - $(CAMEL3$)

5 Procedures for Mobile Originated Calls and Forwarded Calls

NOTE: Other information elements not listed in the following subclauses may be necessary to meet some Stage 1 service requirements. Refer to the Stage 2 specification TS 23.078 for complete information element lists.

5.1 Initial service events

It shall be possible to specify which of the following initial service events shall initiate contact with the CSE:

- Collection of dialled digits;

$(begin$(CAMEL3$)

- Analysis of dialled digits;
- Detection of unsuccessful call establishment.
  Unsuccessful call establishment may be caused by:
  - Route select failure.

$(end$(CAMEL3$)

The definition of which of the above initial service events shall initiate contact with the CSE is part of the subscriber's CAMEL subscription information. Analysis of dialled digits can open a new dialogue regardless of whether a relationship exists. Upon detection of unsuccessful call establishment no new relationship is opened if there is already a dialogue open due to the same CSI.

5.2 Criteria for contact with the CSE - $(CAMEL2$)

It shall be possible for the HPLMN to specify criteria which must be satisfied before the CSE is contacted.

The following criteria may be defined:

5.2.1 CSI criteria applicable at call setup

5.2.1.1 CSI criteria applicable at call setup when dialled digits have been collected - $(CAMEL2$)

CSI criteria may be defined for a subscriber for the case where collection of dialled digits has been performed. - $(CAMEL3$)

- Criteria on the dialled number; these consist of:
  - The contents of the dialled number (a list of up to 10 dialled number strings may be defined in the criteria. Each dialled number string may be of any type of number (TON) format supported by the access protocol).
  - The length of the dialled number (a list of up to three lengths may be defined.).
- The criteria on the dialled number may be collectively defined to be either "enabling" triggering criteria or "inhibiting" triggering criteria (see below). The HPLMN may also choose not to define any criteria on the dialled number.
- A criterion on the basic service: this consists of a list of up to 5 basic service codes for individual basic services or basic service groups. The HPLMN may also choose not to define any criterion on the basic service.
- A criterion on the type of call: this consists of defining whether the call must be a forwarded call.

  A call is treated as forwarded in this respect when either a forwarding supplementary service applies or when the call is forwarded as a result of a terminating CAMEL based service. The HPLMN may also choose not to define any criterion on the type of call.

If the criteria on the dialled number are "enabling" then the dialled number criteria are satisfied if:

- The dialled number matches a dialled number string defined in the criteria; or
- The length of the dialled number matches a dialled number length defined in the criteria.

If the criteria on the dialled number are "inhibiting" then the dialled number criteria are satisfied if:

- The dialled number does not match any of the dialled number strings defined in the critera; and
- The length of the dialled number is not the same as any dialled number length defined in the criteria.

In these tests the dialled number matches one of the dialled number strings if:

- The two numbers are of the same Type Of Number (TON); and
- The dialled number is at least as long as the dialled number string in the criteria; and
- All the digits in the dialled number string in the criteria match the leading digits of the dialled number.

If no criterion on the dialled number is specified then the dialled number criteria are satisfied.

The criterion on the basic service is satisfied if the basic service used for the call corresponds to any basic service code or basic service group defined in the criterion or if no basic service criterion is specified.

The criterion on the type of call is satisfied if the type of the call is the same as the type defined in the criterion or if no call type criterion is specified.

The criteria on the call setup event procedure are satisfied if:

- The criteria on the dialled number are satisfied; and
- The criterion on the basic service is satisfied; and
- The criterion on the type of call is satisfied.

5.2.1.2 CSI criterion applicable at call setup for subscribed dialled services - $(CAMEL3S)

A CSI criterion on the contents of the called number shall be defined for subscribed dialled services. A list of up to 10 called number strings may be defined in the criterion. Each entry in the called number list has associated with it a CSE identity and a service key which defines the service to be triggered if the criterion is satisfied.

If any other CAMEL dialogue has changed the called number, then the modified called number shall be used for the conditional triggering check.

The called number criterion is satisfied if the called number matches a called number string defined in the criterion.

In this test the called number matches one of the called number strings if:

- The two numbers are of the same Type Of Number (TON); and
- The called number is at least as long as the called number string in the criteria; and
- All the digits in the called number string in the criteria match the leading digits of the called number.

5.2.1.3 CSI criterion applicable on detection of unsuccessful call establishment - $(CAMEL3$)

A criterion on the release cause may be defined. This consists of a list of up to 5 cause values. The criterion on the release cause is satisfied if the received call release cause corresponds to any cause value defined in the list or if no criterion is defined.

5.3 Call set-up request procedure

5.3.1 Procedure when dialled digits have been collected

The purpose of this procedure is to detect a call set-up request at the point where digits have been collected but not analysed, and to allow the CSE to modify the handling of the call set-up request.

If (according to the CSI):

- The subscriber is provisioned with a CAMEL based originating service; and
- The call set-up request occurs; and
- The criteria are satisfied. - $(CAMEL2$)

Then the VPLMN/IPLMN shall suspend call processing, make contact with the CSE and await further instructions.

For mobile originated calls the information listed in table: A-1 (Call set-up request procedure 1) shall be provided to the CSE if available.

For forwarded calls the information listed in table: A-1 (Call set-up request procedure 2) shall be provided to the CSE if available.

When the VPLMN/IPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below.

- Perform charging activities; - $(CAMEL2$)
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Called party connection;
    - Call disconnection;

- Calling party abandon; - $(CAMEL2$)
- Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer; - $(CAMEL2$)

- The party in the call for which the event shall be detected and reported (calling or called party);
- The type of monitoring (control or notification).

- Order in-band user interaction. - $(CAMEL2$)

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Bar the call (i.e. release the call prior to connection);
- Continue the call processing;
- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Call set up request procedure 1).

5.3.2 Procedure for subscribed dialled services - $(CAMEL3$)

The purpose of this procedure is to detect a call set-up request at the point where the called party number has been compared with the dialled services information, and allow the CSE to modify the handling of the call set-up request. Triggering of this procedure shall happen immediately after the procedure when dialled digits have been collected.

5.3.2.1 Initiation of contact with the CSE

If (according to the CSI):

- The subscriber is provisioned with a CAMEL based originating service; and
- The call set-up request occurs; and
- The criteria are satisfied.

Then the VPLMN/IPLMN shall suspend call processing, make contact with the CSE and await further instructions.

Contact with the CSE shall (if necessary) be made in this manner before network dialled services are invoked.

For mobile originated calls the information listed in table: A-1 (Call set-up request procedure 3) shall be provided to the CSE if available.

For forwarded calls the information listed in table: A-1 (Call set-up request procedure 4) shall be provided to the CSE if available.

5.3.2.2 Further processing of the call

When the VPLMN/IPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN/IPLMN to act as described below:

- Perform charging activities The CSE is only allowed to send e-values (refer to sect. 15.1, ‘CSE controlled e-values’) and include free format data in Call Data Records (refer to sect. 15.2, ‘Inclusion in charging records of information received from the CSE’);
- Order in-band user interaction. (Interaction between the service triggered from previous triggering may be needed to avoid duplicated guidance etc.).

Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the call;
- Continue the call processing;

- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Call set up request procedure 2).

5.4 Calling party abandon $(CAMEL2$)

The purpose of this procedure is to manage an outgoing call set-up at the time it is terminated by the calling party before the call is established.

If the CSE has activated this subsequent service event for this call in notify mode and the calling party abandon event occurs the VPLMN/IPLMN shall:

- Notify the CSE and continue.

The following information shall be provided to the CSE:

- Event met;

- Type of monitoring;

The CSE shall send the following instruction:

- Continue the call processing.

$(begin$(CAMEL3$)

If the CSE has activated this subsequent service event for this call in request mode and the calling party abandon event occurs the VPLMN/IPLMN shall suspend call processing, make contact with the CSE and await further instructions.

When the VPLMN/IPLMN has made contact with the CSE in request mode, the CSE shall be able to instruct the VPLMN to act as described below.

- Perform charging activities;

There shall be no restriction regarding the number of times the above instruction can be repeated. Once the CSE has concluded issuing the above instruction, it shall issue the following instruction:

- Coninue the call processing.

$(end$(CAMEL3$)

5.5 Unsuccessful call establishment - $(CAMEL2$)

The purpose of this procedure is to manage an outgoing call set-up at the time when the call establishment is unsuccessful.

If no control relationship for the given call exists and

- The unsuccessful call establishment procedure is defined as an initial service event (according to the CSI); and

- The call attempt is unsuccessful; and

- The triggering criteria are satisfied .

Then the VPLMN/IPLMN shall suspend call processing, make contact with the CSE and await further instructions.

If a relationship for the given call already exists and the CSE has activated this subsequent service event for this call and the unsuccessful call establishment event occurs the VPLMN/IPLMN shall:

- Suspend call processing, notify the CSE and await further instructions, or

- Notify the CSE and continue call processing.

In both cases above the following information shall be provided to the CSE:

- Event met;
- Type of monitoring;
- Cause for unsuccessful call establishment:
  - Not reachable;
  - Busy;
  - No answer;
  - Route select failure.

If the unsuccessful call procedure is armed as an initial service event, the information listed in table: A-1 (Unsuccessful call establishment (MO)) shall also be provided to the CSE if available. A new relationship is opened only if triggering criteria are fulfilled and no relationship already exists for the same CSI. - $(CAMEL3$)

When the VPLMN/IPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN/IPLMN to act as described below:

- Perform charging activities;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Called party connection;
    - Call disconnection;
    - Calling party abandon;
    - Unsuccessful call establishment. In thecase of no answer the CSE may provide a no answer timer.
  - The party in the call for which the event shall be detected and reported (calling or called party);
  - The type of monitoring (control or notification).
- Order in-band user interaction.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the call;
- Continue the call processing;
- Continue the call processing with modified information. The CSE shall have the possibility to send the following information listed in table: A-2 (Unsuccessful call establishment (MO)).

5.6 Called party connection procedure

The purpose of this procedure is to manage an outgoing call set-up at the time when the called party answers and the call is successfully established.

If the CSE has activated this subsequent service event for this call and the called party connection event occurs the VPLMN/IPLMN shall:

- Suspend call processing, notify the CSE and await further instructions, or
- Notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met;
- The party in the call for which the event is reported (only Called party applicable);
- Type of monitoring.

When the VPLMN/IPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Perform charging activities;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Call disconnection.
  - The party in the call for which the event shall be detected and reported (calling or called party);
  - The type of monitoring (control or notification).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the call;
- Continue the call processing.

5.7 Void

5.8 Call disconnection procedure

The purpose of this procedure is to manage the actions on disconnection of an established call. This procedure is applicable to the calling party and to the called party.

If the CSE has activated this subsequent service event for this call and the call disconnection event occurs the VPLMN/IPLMN shall:

- Suspend call processing, notify the CSE and await further instructions, or
- Notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met;
- The party in the call for which the event is reported;
- Type of monitoring;
- Disconnection reason.

$(begin$(CAMEL2$)

When the VPLMN/IPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN/IPLMN to act as described below:

- Perform charging activities ;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:

- The subsequent service event which shall be detected and reported:
  - Called party connection;
  - Call disconnection;
  - Calling party abandon;
  - Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer.
- The party in the call for which the event shall be detected and reported (calling or called party);
- The type of monitoring (control or notification).

- Order in-band user interaction.

$(end$(CAMEL2$)

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instruction:

- Continue the call processing, i.e. release the call;
- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Call disconnection procedure (MO)). - $(CAMEL2$)

5.9 CSE initiated call release procedure

Following the CAMEL processing of the Call set-up request procedure it shall be possible for the CSE to initiate a call release at any moment of the call.

To use this procedure:

- The originating VPLMN shall have reported an initial service event to the CSE and be waiting for instructions from the CSE, or
- The CSE shall be waiting for the report of any subsequent service event (with ”Type of monitoring” set to control.).

5.10 Void

6 Procedures for Mobile Terminated Calls

NOTE: Other information elements not listed in the following subclauses may be necessary to meet some Stage 1 service requirements. Refer to the Stage 2 specification TS 23.078 for complete information element lists.

In the following subclauses VPLMN applies to CAMEL3 only.

6.1 Initial service events

It shall be possible to specify which of the following initial service events shall initiate contact with the CSE:

- Terminating Attempt Authorised;

$(begin$(CAMEL3$)

- Detection of unsuccessful call establishment.

  Unsuccessful call establishment may be caused by:

- Called subscriber busy;
- Called subscriber not reachable;
- No answer from called subscriber.

Upon detection of unsuccessful call establishment no new relationship is opened if there is already a dialogue opened due to same CSI.

$(end$(CAMEL3$)

6.2 Criteria for contact with the CSE - $(CAMEL2$)

6.2.1 CSI criteria applicable on terminating attempt authorisation

It shall be possible for the HPLMN to specify a criterion which must be satisfied before the CSE is contacted.

The following criterion may be defined:

- A criterion on the basic service; this consists of a list of up to 5 basic service codes for individual basic services or basic service groups. The HPLMN may also choose not to define any criterion on the basic service.

The criterion on the basic service is satisfied if the basic service used for the call corresponds to any basic service code defined in the criterion or if no basic service criterion is specified.

On the incoming call request event procedure the CSE shall be contacted if the criterion on the basic service is satisfied.

6.2.2 CSI criterion applicable on detection of unsuccessful call establishment - $(CAMEL3$)

A criterion on the failure reason may be defined. This consists of a list of up to 5 failure reasons. A failure reason can denote a release cause value or can denote that the HPLMN determined that the called subscriber was not reachable. The criterion on the failure reason is satisfied if the reason for failure of the call corresponds to any failure reason defined in the list or if no criterion is defined.

6.3 Incoming call request procedure

The purpose of this procedure is to detect an incoming call request and allow the CSE to modify the handling of the incoming call.

If (according to the CSI):

- The subscriber is provisioned with a CAMEL based terminating service; and
- The incoming call request event occurs

Then the IPLMN/VPLMN shall suspend call processing, make contact with the CSE and await further instructions.

For mobile terminated calls the following information listed in table: A-1 (Incoming call request procedure) shall be provided to the CSE if available.

When the IPLMN/VPLMN has made contact with the CSE, the CSE shall be able to instruct the IPLMN to act as described below:

- Perform charging activities; - $(CAMEL2$)
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Called party connection;
    - Call disconnection;

- Calling party abandon; - $(CAMEL2$)
- Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer. - $(CAMEL2$)

- The party in the call for which the event shall be detected and reported (calling or called party);
- The type of monitoring (control or notification).

- Suppress tones and announcements which may be played to the calling party, if an unsuccessful call establishment occurs.

  This is applicable only when the called party number is unchanged by the CSE. - $(CAMEL1$)

- Order in-band user interaction. - $(CAMEL2$)

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Bar the call (i.e. release the call before connection);
- Continue the call processing;
- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Incoming call request procedure).

If the CSE instructs the IPLMN/VPLMN to continue the call processing with a changed called party number, the CSE shall indicate whether the resulting call shall be treated by the IPLMN/VPLMN as a forwarded call. Any forwarded call resulting from a CSE Call Forwarding service may cause an invocation of any mobile originated CAMEL based service in the IPLMN/VPLMN.

If the CSE instructs the IPLMN to allow the call processing with modified information, the CSE may send to the IPLMN an alerting pattern in order to alert the called subscriber in a specific manner. This alerting pattern shall be transferred to the VPLMN. - $(CAMEL2$)

6.4 Calling party abandon - $(CAMEL2$)

The purpose of this subsequent procedure is to manage an incoming call set-up at the time it is terminated by the calling party before the call is established.

If the CSE has activated this service event for this call in notify mode and the calling party abandon event occurs the IPLMN/VPLMN shall:

- Notify the CSE and continue.

The following information shall be provided to the CSE:

- Event met;
- Type of monitoring.

$(begin$(CAMEL3$)

If the CSE has activated this subsequent service event for the call in request mode and the calling party abandon event occurs the IPLMN/VPLMN shall suspend call processing, make contact with the CSE and await further instructions.

When the IPLMN/VPLMN has made contact with the CSE in request mode, the CSE shall be able to instruct the IPLMN/VPLMN to act as described below:

- Perform charging activities.

There shall be no restriction regarding the number of times the above instruction can be repeated. Once the CSE has concluded issuing the above instruction, it shall issue the following instruction:

- Continue the call processing.

$(end$(CAMEL3$)

6.5 Unsuccessful call establishment - $(CAMEL2$)

The purpose of this procedure is to manage an incoming call set-up at the time when the call establishment is unsuccessful.

$(begin$(CAMEL3$)

If no relationship for the given call exists and

- The unsuccessful call establishment procedure is defined as an initial service event (according to the CSI); and
- The call attempt is unsuccessful; and
- The triggering criteria are satisfied

Then the VPLMN/IPLMN shall suspend call processing, make contact with the CSE and await further instructions.

$(end$(CAMEL3$)

If a relationship for the given call already exists and the CSE has activated this subsequent service event for this call and the unsuccessful call establishment event occurs the VPLMN/IPLMN shall:

- Suspend call processing, notify the CSE and await further instructions, or
- Notify the CSE and continue call processing.

In both cases above the following information shall be provided to the CSE:

- Event met;
- Type of monitoring;
- Cause for unsuccessful call establishment:
    - Not reachable;
    - Busy;
    - No answer;
    - Forwarding notification.

If the unsuccessful call establishment procedure is armed as an initial service event, information listed in table: A.1 (Unsuccessful call establishment (MT)) shall be provided to the CSE additionally if available. - $(CAMEL3$)

When the IPLMN/VPLMN has made contact with the CSE, the CSE shall be able to instruct the IPLMN to act as described below:

- Perform charging activities;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
    - The subsequent service event which shall be detected and reported:
        - Called party connection;
        - Call disconnection;
        - Calling party abandon;
        - Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer.
    - The party in the call for which the event shall be detected and reported (calling or called party);
    - The type of monitoring (control or notification).

- Order in-band user interaction.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the call;
- Continue the call processing;
- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Unsuccessful call establishment (MT)).

6.6 Called party connection procedure

The purpose of this procedure is to manage an incoming call set-up at the time when the called party answers and the call is successfully established.

If the CSE has activated this subsequent service event for this call and the called party connection event occurs, the IPLMN/VPLMN shall:

- Suspend call processing, notify the CSE and await further instructions, or
- Notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met;
- The party in the call for which the event is reported (only Called party applicable);
- Type of monitoring.

When the IPLMN/VPLMN has made contact with the CSE, the CSE shall be able to instruct the IPLMN/VPLMN to act as described below:

- Perform charging activities; - $(CAMEL2$)
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - (Call disconnection).
  - The party in the call for which the event shall be detected and reported (calling or called party);
  - The type of monitoring (control or notification).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the call;
- Continue the call processing.

6.7 Void

6.8 Call disconnection procedure

The purpose of this procedure is to manage the actions on disconnection of an established call.

If the CSE has activated this subsequent service event for the call and the call disconnection event occurs the IPLMN/VPLMN shall:

- Suspend call processing, notify the CSE and await further instructions, or
- Notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met;
- The party in the call for which the event is reported;
- Type of monitoring;
- Disconnection reason.

$(begin$(CAMEL2$)

When the IPLMN/VPLMN has made contact with the CSE, the CSE shall be able to instruct the IPLMN/VPLMN to act as described below:

- Perform charging activities;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The service subsequent event which shall be detected and reported:
    - Called party connection;
    - Call disconnection;
    - Calling party abandon;
    - Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer.
  - The party in the call for which the event shall be detected and reported (calling or called party);
  - The type of monitoring (control or notification).
- Order in-band user interaction.

$(end$(CAMEL2$)

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instruction:

- Continue the call processing, i.e. release the call;
- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Call disconnection procedure (MT)). - $(CAMEL2$)

6.9 CSE initiated call release procedure

Following the CAMEL processing of the incoming call request procedure it shall be possible for the CSE to initiate a call release at any moment of the call.

To use this procedure:

- The originating VPLMN shall have reported an initial service event to the CSE and be waiting for instructions from the CSE, or
- The CSE shall be waiting for the report of a subsequent service event (with ”Type of monitoring” set to control).

7 Procedures for serving network dialled services - $(CAMEL3$)

The purpose of this procedure is to detect a match between the called party number and a stored network service number at the call set-up request. It is to allow the CSE to modify the handling of the call set-up request. If this procedure is triggered it shall happen after processing of Subscribed Dialled Services triggered via the CSI. If any other CAMEL dialogue has changed the called party number then the modified called party number is used for conditional triggering check.

7.1 Initiation of contact with the CSE

If:

- The call set up request occurs and
- The call set up request procedure is passed, and
- The PLMN is provisioned with network based service information

Then the VPLMN shall suspend call processing, make contact with the CSE and await further instructions.

For mobile originated calls the following information listed in table: A-1 (Procedures for serving network dialled services 1) shall be provided to the CSE if available.

For forwarded calls the information listed in table: A-1 (Procedures for serving network dialled services 2) shall be provided to the CSE if available.

7.2 Further processing of the call

When the serving network has made contact with the CSE, the CSE shall be able to instruct the serving network to act as described below:

- Release the call;
- Continue the call processing;
- Continue the call processing with modified information. The CSE shall have the possibility to send the information listed in table: A-2 (Procedures for serving network dialled services 2);
- Perform charging activities (the CSE is only allowed to include charging data in the Call Data Record);
- Order in-band user interaction. (Interaction between the service triggered from previous triggering may be needed to avoid duplicated guidance etc.)

Further processing of the call continues as detailed in Sections 5.3 to 5.8, and the CSE contact initiated at this procedure is terminated.

8 Void

9 Procedures for SMS - $(CAMEL3$)

9.1 Short message submission request procedure

The purpose of this procedure is to detect an SMS set-up request and to allow the CSE to modify the handling of the SMS set-up request.

The SMS set-up request may be circuit switched based or packet switched based.

If (according to the CSI):

- The subscriber is provisioned with a CAMEL based SMS originating service; and
- The SMS set-up request occurs

Then the VPLMN shall suspend SMS processing, make contact with the CSE and await further instructions.

For mobile originated SMS the following information shall be provided to the CSE if available:

- Event met;
- IMSI;
- Short Message handling information;
- Validity Period Format;
- Status Report Request;
- User Data Header Indicator;
- Reply Path;
- Protocol Identifier;
- Data Coding Scheme;
- Validity Period;
- SMSC address;
- Calling Party Number;
- Service Key;
- Location information of the calling subscriber;
- Time and time zone;
- Called Party Number.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below.

- Perform charging activities;
- Activate subsequent control service events for the SM submission. The CSE shall have the possibility to send the following information:
    - The subsequent service event which shall be detected and reported:
        - Successful SM submission to the SMSC;
        - Unsuccessful SM submission to the SMSC;
        - The type of monitoring.

There shall be no restriction regarding the order of the above instructions. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Bar the SM submission;
- Continue the SM submission;
- Continue the SM submission with modified information. The CSE shall have the possibility to send the following information:
  - Called Party Number;
  - Calling Party Number;
  - SMSC address.

If the SM submission is barred, the served subscriber shall be informed.

9.2 Successful Short Message submission procedure

The purpose of this procedure is to detect the successful submission of a Short Message (SM) to the SMSC and to inform the CSE about it.

If the successful SM submission event occurs then the VPLMN shall suspend processing, make contact with the CSE and await further instructions or send a notification and continue.

The following information shall be provided to the CSE, if available:

- Event met;
- Type of monitoring.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below.

- Perform charging activities.

Once the CSE has concluded performing charging activities, it shall issue the following instruction:

- Continue the processing.

9.3 Unsuccessful Short Message submission procedure

The purpose of this procedure is to detect the unsuccessful submission of a Short Message (SM) to the SMSC and to inform the CSE about it.

If the unsuccessful SM submission event occurs then the VPLMN shall suspend processing, make contact with the CSE and await further instructions or send a notification and continue.

The following information shall be provided to the CSE, if available:

- Event met;
- Type of monitoring.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Perform charging activities.

Once the CSE has concluded performing charging activities, it shall issue the following instruction:

- Continue the processing.

9.4 Charging Procedures

9.4.1 Inclusion of Free Format data in CDR

The CSE may send free format data to the VPLMN, for inclusion in a CDR.

When sending the free format data to the VPLMN, the CSE may instruct the VPLMN to

- Overwrite the existing data in the CDR with the newly received free format data, or
- Append the newly received free format data to the existing data in the CDR.

10 Procedures for GPRS Data Transmission - $(CAMEL3$)

NOTE: Other information elements not listed in the following subclauses may be necessary to meet some Stage 1 service requirements. Refer to the Stage 2 specification TS 23.078 for complete information element lists.

10.1 Initial service events

It shall be possible to specify the following initial service events which shall initiate contact with the CSE:

- Attach procedure: a subscriber requests to register to the GPRS network;
- PDP Context Establishment: a subscriber requests the activation of a Packet Data Protocol Context;
- PDP Context Establishment Acknowledgement: the SGSN has received an acknowledgement from the GGSN for that request.
- Change of Position (Session): a subscriber who has an active GPRS Session changes position to another SGSN;
- Change of Position (PDP Context): a subscriber who has an active PDP Context changes position to another SGSN.

10.2 Void

10.3 Attach procedure

The purpose of this procedure is to detect a request from a GPRS subscriber to attach to the data network and allow the CSE to modify the handling of the attach request.

If (according to the CSI):

- The subscriber is provisioned with a CAMEL based service, relevant for GPRS data transmission; and
- The attach request is set as a trigger detection; and
- The attach request occurs;

Then the VPLMN shall suspend attach processing, make contact with the CSE and await further instructions.

The information listed in table: A-3 (Attach) shall be provided to the CSE, if available.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the period being attached to the data network. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - PDP Context Establishment request;
    - PDP Context Establishment Acknowledgement;
    - Change of position (session);
    - Detach;
    - Type of monitoring
  - Perform charging activities (amongst others defining a time threshold). The charging activities shall apply to the GPRS Session.

There shall be no restriction regarding the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Reject the attachment request;
- Continue the processing.

10.4 PDP Context Establishment

The purpose of this procedure is to manage a request from the subscriber to activate a Packet Data Protocol. Multiple contacts to the CSE may be made in parallel due to PDP Context Establishment events being detected whilst a GPRS subscriber is attached to the network. If either (according to the CSI):

- The subscriber is provisioned with a CAMEL based service relevant for GPRS data transmission, and
- The PDP activation request is set as a trigger detection, and
- The PDP Activation request occurs.

Or the CSE has activated this service event for the attached subscriber and the PDP activation event occurs then the VPLMN shall either

- Suspend processing, make contact with the CSE and await further instructions, or
- Send a notification and continue.

When the PDP Context Establishment event occurs, it shall be reported as a Subsequent Service Event, if armed by the CSE. If it is not armed by the CSE, it shall be reported as an Initial Service Event, if statically armed in the subscription information.

The information listed in table: A-3 (PDP Context Establishment) shall be provided to the CSE if available.

- The column marked as '*Initial Service event*' indicates the elements to be reported when the PDP Context Establishment is reported as an *Initial Service Event*.
- The column marked as *"Subsequent Service Event"* indicates the elements to be reported when the PDP Context Establishment is reported as a *Subsequent Service Event*.

10.4.1 PDP Context Establishment reported as Initial Service Event

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Change of position (PDP Context);
    - PDP Context Establishment Acknowledgement;
    - PDP deactivation;
  - The type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold). The charging activities shall apply to the PDP Context.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Continue the processing;
  - Continue the processing with modified information. The CSE shall have the possibility to send the following information:
    - Access Point Name.

10.4.2 PDP Context Establishment reported as Subsequent Service Event

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below.

- Activate subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - PDP Context Establishment Acknowledgement;
    - Change of position (PDP Context);
    - PDP deactivation;
    - Change of Position (Session);
    - Detach.
  - The type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Release the GPRS Session;
- Continue the processing;
- Continue the processing with modified information. The CSE shall have the possibility to send the following information:
  - Access Point Name.

10.5 PDP Context Establishment Acknowledgement

The purpose of this procedure is to manage a confirmation from the GGSN to activate a Packet Data Protocol. Multiple contacts to the CSE may be made in parallel due to PDP Context Establishment Acknowledgement events being detected whilst a GPRS subscriber is attached to the network.

If either (according to the CSI):

- The subscriber is provisioned with a CAMEL based service relevant for GPRS data transmission, and
- The PDP Context Establishment acknowledgement is set as a trigger detection point, and
- The PDP Context Establishment Acknowledgement request occurs

Or the CSE has activated this service event for the attached and / or active subscriber and the PDP activation acknowledgement event occurs then the VPLMN shall either:

- Suspend processing, make contact with the CSE and await further instructions, or
- Send a notification and continue.

When the PDP Context Establishment Acknowledgement event occurs, it shall be reported as a Subsequent Service Event, if armed by the CSE. If it is not armed by the CSE, it shall be reported as Initial Service Event, if statically armed in the subscription information.

The information listed in table: A-3 (PDP Context Establishment Acknowledgement) shall be provided to the CSE if available.

- The column marked as *'Initial Service event'* indicates the elements to be reported when the PDP Context Establishment Acknowledgement is reported as an *Initial Service Event*.
- The column marked as *'Subsequent Service Event – PDP Context control relationship'* indicates the elements to be reported when the PDP Context Establishment Acknowledgement is reported as a *Subsequent Service Event* within a PDP Context control relationship.
- The column marked as *'Subsequent Service Event – GPRS Session I'* indicates the elements to be reported when the PDP Context Establishment Acknowledgement is reported as a *Subsequent Service Event within a GPRS Session control relationship*, whereby this event is the first event to be reported for this PDP Context.
- The column marked as *'Subsequent Service Event – GPRS Session II'* indicates the elements to be reported when the PDP Context Establishment Acknowledgement is reported as a *Subsequent Service Event within a GPRS Session control relationship*, whereby the PDP Context Establishment for this PDP Context was already reported.

10.5.1 PDP Context Establishment Acknowledgement reported as an Initial Service Event

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Change of position (PDP Context);
    - PDP deactivation;
    - Type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold). The charging activities shall apply to the PDP Context.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Continue the processing.

10.5.2 PDP Context Establishment Acknowledgement reported as a Subsequent Service Event in PDP Context relationship

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Change of position (PDP Context);
    - PDP deactivation.
  - Type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold).
  The charging activities shall apply to the PDP Context.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release PDP Context;
- Continue the processing.

10.5.3 PDP Context Establishment Acknowledgement reported as a Subsequent Service Event within GPRS Session relationship (I)

This event is reported within a GPRS Session relationship and this is the first event to be reported for this PDP Context. (The PDP Context Establishment event for this PDP Context was not reported)

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Change of position (PDP Context);
    - PDP deactivation;
    - Change of Position (Session);
    - Detach.
  - Type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Release the GPRS Session;
- Continue the processing.

10.5.4 PDP Context Establishment Acknowledgement reported as a Subsequent Service Event within GPRS Session relationship (II)

This event is reported within a GPRS Session relationship and this is not the first event to be reported for this PDP Context. (The PDP Context Establishment event for this PDP Context was already reported.)

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Change of position (PDP Context);
    - PDP deactivation;
    - Change of Position (Session);
    - Detach.
  - Type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Release the GPRS Session;
- Continue the processing.

10.6 Change of Position Procedure

The purpose of this procedure is to detect a request from the GPRS subscriber to update the routing area. A change of position can be an intra-SGSN routeing area update (update within the same SGSN) or an inter-SGSN routeing area update (update from one SGSN to another SGSN). When an intra-SGSN routeing area update occurs, then this event shall be reported as a Subsequent Service Event, if it was armed by the CSE.

When an inter-SGSN routeing area update occurs, then this event shall be reported as an Initial Service Event, if it was statically armed in the GPRS Subscription data. In this case, the previous relationship shall be terminated.

The change of position event can be armed and reported for a GPRS Session relationship and for a PDP Context relationship.

10.6.1 Intra-SGSN Change of Position

If the CSE has activated this service event and a change of position occurs, the VPLMN shall send a notification and continue.

Table A-4, columns 1 and 2, lists the information which shall be provided to the CSE, if available.

10.6.2 Inter-SGSN Change of Position

If this event is statically armed and the inter-SGSN change of position event occurs, then the VPLMN shall suspend processing, make contact with the CSE and await further instructions.

Table A-4, columns 3 and 4, lists the information which shall be provided to the CSE, if available.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - PDP Context Establishment;
    - PDP Context Establishment Ackwowledgement;
    - Change of position (PDP Context);
    - PDP deactivation;
    - Change of Position (Session):
      This subsequent service event may be armed only if the Change of Position Initial Service Event was reported for a GPRS Session;
    - Detach:
      This subsequent service event may be armed only if the Change of Position Initial Service Event was reported for a GPRS Session.
  - Type of monitoring.
- Perform Charging Activities (amongst others defining a data or time threshold).
  GPRS Session related charging activities may be instructed only if the Change of Position Initial Service Event was reported for a GPRS Session.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Release the GPRS Session;
  The Release GPRS Session instruction may be given only if the Change of Position Initial Service Event was reported for a GPRS Session.
- Continue the processing.

10.7 Data Volume or Time Threshold Procedure

The purpose of this procedure is to control the amount of data transmitted by and transmitted to the served subscriber or the used time per GPRS Session or PDP Context. The time threshold is valid either for the GPRS session or for one PDP Context of the subscriber only. The data threshold is valid for one PDP context only. If the subscriber controls simultaneous PDP Contexts, time thresholds per GPRS session or PDP Context may be defined. If the subscriber controls simultaneous PDP Contexts, data thresholds per PDP Context may be defined.

For correct performance, the threshold shall be available for the first time as a response to a GPRS Session establishment (if valid for the GPRS Session) or as a response to a PDP Context Establishment (if valid for the PDP Context). Subsequent thresholds may be received immediately after the expiry of the previous threshold or at change of QoS.

The type of threshold is indicated per GPRS session or PDP Context as:

- A maximum amount of data transmitted by and transmitted to the subscriber
- A granted time to transmit and receive data.

A threshold is reached within a GPRS session or PDP Context, when:

- The total amount of data transmitted by and transmitted to the subscriber within the PDP context reaches the granted data volume for that PDP context, or
- The allowed time for the GPRS Session or PDP Context has elapsed.

If the CSE has defined a threshold for a GPRS Session or PDP Context and the threshold has been reached, then the VPLMN shall inform the CSE.

The VPLMN shall not suspend the transmission of data packets to and from the GPRS terminal. The VPLMN shall immediately restart counting the amount of data transmitted by and transmitted to the GPRS terminal and restart timing the duration of the GPRS Session or PDP Context.

The following information shall be provided to the CSE if available:

- Charge result (elapsed time or total amount of data transmitted);
- The GPRS session or PDP Context for which the event is reported;
- GPRS Session or PDP Context-Active indicator.

When the VPLMN has reported the reaching of the threshold to the CSE, the CSE shall be able to do the following (assuming the continuation of the applicable dialogue):

- Perform charging activities (including the defining of a new threshold or time limit). GPRS Session related charging activities may be sent only if a GPRS Session related charging threshold was reported;
- Activate subsequent control service events for the PDP Context or GPRS Session. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - PDP deactivation;
    - Change of Position (PDP Context);
    - Change of Position (Session): this event may be armed only if the PDP deactivation event is reported within a GPRS Session relationship;
    - Detach: this event may be armed only if the data or time threshold event is reported within a GPRS Session relationship.
- The GPRS session or PDP Context for which the event shall be monitored and reported;
- The type of monitoring (only monitor mode is allowed in this case).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated.

Once the CSE has concluded issuing the above instructions, issue one and only one of the following instructions (provided the GPRS session or PDP context has not been released):

- Release the PDP Context;

- Release the GPRS Session: this instruction may be given only if the data or time threshold event is reported within a GPRS Session relationship;

- Continue the GPRS session or PDP Context.

10.8 PDP deactivation Procedure

The purpose of this procedure is to detect a request from the subscriber to release a Packet Data Protocol.

If the CSE has activated this subsequent service event for the attached subscriber and the PDP deactivation event occurs then the VPLMN shall suspend processing, make contact with the CSE and await further instructions or send a notification and continue.

The following information shall be provided to the CSE:

- Event met;

- The PDP Context for which the event is reported;

- Type of monitoring.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Activate subsequent control service events for the GPRS session. The CSE shall have the possibility to send the following information:

- the subsequent service event which shall be detected and reported:

    - Detach Procedure: this event may be armed only if the PDP deactivation event is reported within a GPRS Session relationship;

    - Change of Position (Session): this event may be armed only if the PDP deactivation event is reported within a GPRS Session relationship;

  - The type of monitoring.

- Perform charging activities: GPRS Session related charging instructions may be sent only if the PDP deactivation event is reported within a GPRS Session relationship.

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall send one and only one of the following instructions:

- Release the GPRS Session: this instruction may be given only if the PDP deactivation event is reported within a GPRS Session relationship;

- Continue the processing.

10.9 Detach procedure

The purpose of this procedure is to detect a request from a GPRS subscriber to detach from the data network.

If the CSE has activated this subsequent service event for the attached subscriber and the Detach event occurs, then the VPLMN shall suspend processing, make contact with the CSE and await further instructions or send a notification and continue.

The following information shall be provided to the CSE, if available:

- Event met;

- Type of monitoring.

When the VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Perform charging activities. Only Session related charging instructions may be sent.

There shall be no restriction regarding the number of times the above instruction can be repeated. Once the CSE has concluded issuing the above instruction, it shall send the following instruction:

- Continue the processing.

10.10 CSE Initiated GPRS Detach Procedure

Following the CAMEL processing of the GPRS attach procedure it shall be possible for the CSE to initiate a GPRS detach at any time.

To use this procedure, there shall be a control relationship between the CSE and the GPRS session.

10.11 CSE Initiated PDP Context Deactivation Procedure

Following the CAMEL processing of the PDP Context Establishment procedure or PDP Context Establishment Acknowledgement procedure, it shall be possible for the CSE to initiate PDP Context deactivation at any time.

To use this procedure, there shall be a control relationship between the CSE and the PDP Context.

10.12 Change of Quality of Service Procedure

The CSE may request the VPLMN to report a change in the Quality of Service (QoS) for a specific PDP Context.

When a QoS change occurs, then the VPLMN shall send a notification to the CSE and continue.

The following information shall be provided to the CSE:

- Charge result – this may be elapsed time or the total amount of data transmitted by and transmitted to the subscriber;
  - Quality of Service;
  - PDP Context state.

When the CSE receives the notification of change of QoS, it may instruct the VPLMN to act as follows:

- Perform charging activities (including the defining of a new threshold). GPRS Session related charging instructions may be sent only if the change of PDP Context QoS event is reported within a GPRS Session relationship;
- Activate subsequent control service events for the PDP Context or GPRS Session. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - PDP deactivation;
    - Change of Position (PDP Context);
    - Change of Position (Session): this event may be armed only if the change of PDP Context QoS event is reported within a GPRS Session relationship;
    - Detach Procedure: this event may be armed only if the change of PDP Context QoS event is reported within a GPRS Session relationship.
  - The PDP Context for which the event shall be monitored and reported;
  - The type of monitoring (only monitor mode is allowed in this case).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated.

Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the PDP Context;
- Release the GPRS Session: this instruction may be given only if the change of PDP Context QoS event is reported within a GPRS Session relationship;
- Continue the PDP Context.

10.13 Charging Procedures

The CSE can perform the following charging activities:

10.13.1 Advice of Charge

The CSE may send Charge Advice Information (CAI) elements to the SGSN.

10.13.2 Inclusion of Free Format data in CDR

The CSE may send free format data to the SGSN, for inclusion in a CDR. The CSE shall specify the GPRS session or PDP Context for which the free format data is destined.

When sending the free format data to the VPLMN, the CSE may instruct the VPLMN to

- Overwrite the existing free format data for that GPRS session or PDP Context, or
- Append the newly received free format data to the existing free format data.

10.13.3 Specify a threshold for transmitted data or used time

See section 10.7.

10.13.4 Request notification of change in Quality of Service

The CSE may request the VPLMN to notify the CSE when a change in Quality of Service has occurred for a PDP Context.

11 Void

12 Notification of non-traffic events to the CSE

12.1 Mobility management - $(CAMEL3$)

It shall be possible to mark for a subscriber that a notification shall be sent to the CSE when the VPLMN has completed the processing of any of the following mobility events:

- Location update to a different VLR service area;
- Location update within the same VLR service area;
- MS-initiated detach (MS switched off);

- Network initiated detach (periodic location update of MS failed);
- Attach of MS (MS switched on, successful location update after network initiated detach).

The notification shall contain the following information if available:

- Event met;
- Service Key;
- IMSI;
- Basic MSISDN;
- Location information;
- LSA identity;
- CAMEL phases supported at the VPLMN.

12.2 Notification to CSE of change of subscriber data - $(CAMEL3$)

It shall be possible to mark for a subscriber that a notification shall be sent to the CSE when any of the following subscriber data are changed as a result of a request from any entity except the CSE to which the notification shall be sent:

- CF SS data;
- CB SS data;
- ODB data;
- CAMEL subscription information.

One ore more CSEs may be defined to which the notification shall be sent.

12.3 Supplementary service invocation notification to CSE - $(CAMEL2$)

It shall be possible to mark for a subscriber that a notification shall be sent to the CSE when any of the following supplementary services are invoked:

- ECT;
- CD;
- MPTY;
- CCBS. - $(CAMEL3$)

13 CSE interrogation and control of subscription data

13.1 Any time interrogation

It shall be possible for the CSE (as part of an OSS, including special handling of mobile terminating calls) to interrogate the HLR for information about a particular subscriber, for which it is entitled to do so (e.g. the subscriber belongs to the same HPLMN as the CSE).

This may be information from the list below:

- Subscriber status;
- Location information (see section 22);

$(begin$(CAMEL3$)

- Call Forwarding SS data;
- Call Barring SS data;
- Operator Determined Barring data;
- CAMEL Subscription Information;

$(end$(CAMEL3$)

The HPLMN shall have the possibility to reject any interrogation from any CSE.

13.2 Any time modification - $(CAMEL3$)

It shall be possible for the CSE to modify user data for a particular subscriber, for which it is entitled to do so (e.g. the subscriber belongs to the same HPLMN as the CSE).

- Call Forwarding SS data;
- Call Barring SS data;
- Activation/Deactivation of CAMEL Subscription Information.

The HPLMN shall have the possibility to reject any request for modification from any CSE.

14 Subscriber interactions with the CSE

14.1 Announcement and tones insertion - $(CAMEL2$)

As a part of the call set-up request procedure, unsuccessful call establishment procedure, call disconnection procedure and incoming call request procedure it shall be possible for the CSE to order the playing of announcements or tones to the calling subscriber.

The HPLMN operator is responsible for the administration of announcements. If there is an appropriate bilateral agreement the VPLMN operator may also administer announcements.

14.2 Voice prompting and information collection - $(CAMEL2$)

As a part of the call set-up request procedure, unsuccessful call establishment procedure, call disconnection procedure and incoming call request procedure it shall be possible for the CSE to order voice prompting and information collection towards the calling subscriber. It shall not be possible to collect information from the user as part of the originating CAMEL handling for a forwarded call.

14.3 Subscriber interaction by using USSD - $(CAMEL2$)

It shall be possible for the CSE to initiate the sending of a USSD message to the served subscriber at any time. It shall be possible for the CSE to receive a served subscriber initiated USSD message at any time (see TS 22.030 [3] and TS 22.090 [4]).

14.4 Void

15 Charging Activities - $(CAMEL2$)

The following general principles are valid for CAMEL based charging aspects:

- Calls may be divided into call periods for the purpose of controlling the call duration;
- The management and the control of a tariff switch which applies to subscriber charging is under the responsibility of the HPLMN. The time at which the tariff switches apply shall be the same for the control of e-values and for the control of the call duration;
- The tariff switch time is indicated to the network in the form of a time relative to the reception of the instruction.

15.1 CSE controlled e-values

If the subscriber is provisioned with a CAMEL based service and a contact exists between the VPLMN and the CSE, the CSE shall be able to send e-values for the Advice of Charge supplementary service.

For the purpose of charge indication on the MS even when one (or more) tariff switch occurs during the call, the CSE may send several sets of e-values to the VPLMN, which will transmit them in sequence to the Mobile Station.

Before the call is answered, the CSE may send either one set or two sets of e-values:

- If one set is sent, then the set of e-values is applicable from the beginning of the call, that is from the time the call is answered;
- If two sets are sent, then:
  - A tariff switch time after which the second set becomes valid must also be sent;
  - If the call is answered before the tariff switch time expires, then the first set of e-values is applicable from the beginning of the call and the second set of e-values is stored for future use;
  - If the call is answered after the tariff switch time expires, then the first set of e-values is discarded and the second set of e-values is applicable from the beginning of the call.

During the call, the CSE may send a new set of e-values either to be transmitted directly to the mobile station or to be stored until the next tariff switch is reached. The tariff switch time is sent together with the new set of e-values.

When the tariff switch time is reached, the stored set of e-values (if available) is sent immediately to the mobile station.

15.2 Inclusion in charging records of information received from the CSE

The CSE shall be able at one or several active service events to download free-format charging information to be transparently output to the call record available at the IPLMN/VPLMN depending on the call scenario.

15.3 Support of additional charging information to the CSE

It shall be possible for the CSE to request from the VPLMN/IPLMN a call information report to be delivered at the end of the call. The report shall contain call duration and release cause.

15.4 CSE control of call duration

The purpose of this procedure is to allow the CSE to monitor and influence the call duration.

If the subscriber is provisioned with a CAMEL based service and a contact between the IPLMN/VPLMN and the CSE exists, the CSE shall be able to instruct the IPLMN/VPLMN, at the beginning of the call or during the monitoring of the call, to act as described below:

a) Receive a maximum call period duration from the CSE;

b) Receive a switch time after which the next tariff switch applies;

c) Receive sets of e-values (for the purpose of AoC controlled by the CSE).

The following combinations of the instructions are allowed:

- (a) or (a and b) or (b and c) or (a and b and c) or (c).

In case (a) the CSE shall be able to instruct the IPLMN/VPLMN how to proceed when the maximum call period duration has expired, i.e. release the call or allow the call to continue. In both cases, a charging report shall be sent to the CSE. The CSE shall also be able to instruct the IPLMN/VPLMN to play a tone before the maximum call period duration is expired.

When the IPLMN/VPLMN receives the instruction from the CSE as a result of the call set-up request procedure before the call is established, the IPLMN/VPLMN shall immediately set the reference point for the next tariff switch, if available.

When the call is answered, the IPLMN/VPLMN shall:

- Start the timer for the first call period;
- Send e-values, if available:
    - If one set of e-values was received from the CSE, then the set of e-values is applicable from the beginning of the call, that is from the time the call is answered;
    - If two sets of e-values were received from the CSE, then:
        - A tariff switch time when the second set becomes valid must be also sent;
        - If the call is answered before the tariff switch time expires, then the first set of e-values is applicable from the beginning of the call and the second set of e-values is stored for future use;
        - If the call is answered after the tariff switch time expires, then the first set of e-values is discarded and the second set of e-values is applicable from the beginning of the call.

When the reference point for the tariff switch is reached, the stored set of e-values (if available) is sent immediately to the mobile station.

When the end of a call period is reached, the IPLMN/VPLMN shall report to the CSE:

- If no tariff switch has occurred since the call is answered:
    - The elapsed time since the call is answered.
- If a tariff switch has occurred since the call is answered:
    - The elapsed time since the last tariff switch occurred.
    - The elapsed time from when the call is answered, or from when the previous tariff switch occurred, to the time when the most recent tariff switch occurred.

When the IPLMN/VPLMN has made contact with the CSE, the CSE shall be able to instruct the VPLMN to act as described below:

- Perform charging activities;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
    - The subsequent service event which shall be detected and reported (Call disconnection);

- The party in the call for which the event shall be detected and reported (calling or called party);
- The type of monitoring (control or notification).

There shall be no restriction regarding the order of the above instructions or the number of times each of the above instructions can be repeated. Once the CSE has concluded issuing the above instructions, it shall issue one and only one of the following instructions:

- Release the call;
- Continue the call.

At the end of a call period and after the relevant information was sent to the CSE, the IPLMN/VPLMN may receive instructions applicable to the next call period :

- The timing of the new call period shall start as soon as the previous call period is ended;
- The timing since the call was answered or the last tariff switch occurred shall keep on running;
- If the instruction contains an indication for a new tariff switch during the call period, the IPLMN/VPLMN shall set the reference point for the next tariff switch and store the new set of e-values, if available.

When the reference point for the tariff switch is reached, the stored set of e-values (if available) is sent immediately to the mobile station.

When the call is released, the IPLMN/VPLMN shall report to the CSE:

- If no tariff switch has occurred since the call was answered:
  - The elapsed time since the call was answered.
- if a tariff switch has occurred since the call was answered:
  - The elapsed time since the last tariff switch occurred;
  - The elapsed time from when the call was answered, or from when the previous tariff switch occurred to the time when the most recent tariff switch occurred.

In addition, the report to the CSE shall always contain an indication of whether the call is active or inactive.

The following figure explains the division of a call into separate call periods and shows which information is sent and when from the IPLMN/VPLMN to the CSE.

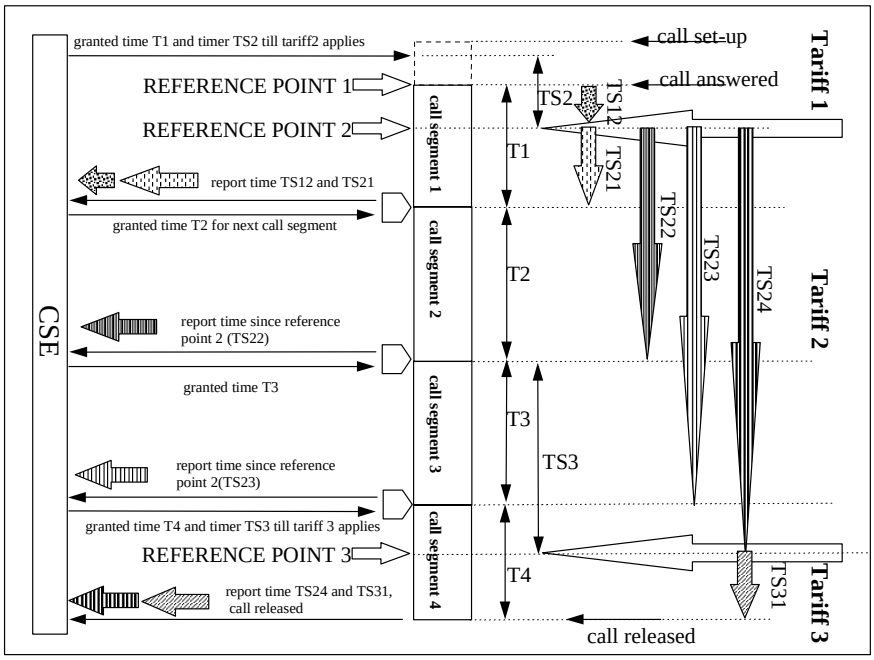

Figure 1: CSE control of call duration

Reference Point 1: when the call is answered, tariff 1 applies
Reference Point 2: the point in time when tariff 2 applies
Reference Point 3: the point in time when tariff 3 applies
A call period is a certain time part of an ongoing call. The duration of a call period is limited by the granted time from the CSE.
Timers indicating the maximum duration (or granted time) for the call periods are called Tx (x is the number of the call period).
Timers indicating the duration until the next tariff applies are called TSx (x is the number of the tariff).
Timers indicating the elapsed time in a certain tariff are called TSxy (x is the number of the tariff and y is the elapsed time since the previous reference point).
When a call period is ended, the elapsed time in each tariff is reported to the CSE.

At the end of the call period any timer indicating the duration until the next tariff switch and any stored e-values are discarded.

If the report is not confirmed by the CSE within a specified time, the IPLMN/VPLMN shall release the call.

The procedure may be repeated sequentially, i.e. when a report is sent to the CSE, the CSE may instruct the IPLMN/VPLMN to monitor the call for a further period.

16 Exceptional procedures or unsuccessful outcome

16.1 Roaming in non-supporting networks

The HPLMN shall control handling of roaming when a CAMEL subscriber attempts to register in a network not supporting CAMEL without relying on extra functionality in network entities not supporting CAMEL. The HPLMN can decide for each subscriber whether to allow roaming, or deny individual services (e.g. by applying ODB or denying location update).

If the HPLMN allows roaming, the OSSs are not supported for the roaming subscriber.

16.2 Call Set-up from a non-supporting interrogating PLMN

If the CAMEL feature is not supported in the IPLMN the following will happen:

- Mobile originating calls:

  Not applicable.

- Mobile terminating calls:

  Mobile terminating OSSs are not supported in the IPLMN if the HPLMN decides to allow the MT call attempt. The HPLMN may also decide to bar the incoming call attempt, or force the routeing interrogation to take place in the HPLMN.

16.3 Roaming in a VPLMN which supports a lower phase of CAMEL

If a CAMEL subscriber attempts to register in a VPLMN which supports CAMEL, the VPLMN shall indicate in the registration request to the HPLMN the phase of CAMEL which the VPLMN supports. If the VPLMN supports only CAMEL phase which is lower than the one subscribed the HPLMN shall take such action (including denying the registration request or transferring to the VPLMN subscription information appropriate to the CAMEL phase supported in the VPLMN) as may be decided by the HPLMN operator. If a certain service requires a certain CAMEL phase (e.g. MO SMS requires at least CAMEL phase 3) and the VPLMN does not support that CAMEL phase, the HPLMN may decide to deny roaming or allow roaming without that particular CAMEL OSS.

16.4 Service attempt from a VPLMN which supports a lower phase of CAMEL

If the served subscriber requests a basic service (call, short message, GPRS attach, GPRS PDP context etc.) which requires the VPLMN to contact the CSE, the VPLMN shall indicate to the CSE which phase of CAMEL has been negotiated between the HPLMN and the VPLMN for this service. If the VPLMN supports a CAMEL phase which is lower than the one subscribed and the CSE determines that as a consequence a service which is provisioned for the subscriber will not operate correctly, the CSE shall take such action (including denying the call request or handling the call using only CAMEL capabilities supported in the VPLMN) as may be decided by the CSE operator.

16.5 Call setup from an IPLMN which supports a lower phase of CAMEL

The IPLMN shall indicate to the HPLMN which phases of CAMEL it supports. The HPLMN may decide to bar the incoming call attempt before contacting the CSE, or force the routeing interrogation to take place in the HPLMN. When the IPLMN contacts the CSE for instructions to handle an MT call, the IPLMN shall indicate to the CSE the phase of CAMEL which has been negotiated between the HPLMN and the IPLMN for this call. If the IPLMN supports a lower CAMEL phase than the one negotiated between the HPLMN and the IPLMN and the CSE determines that as a consequence a service which is provisioned for the subscriber will not operate correctly, the CSE shall take such action (including denying the call request or handling the call using only CAMEL capabilities negotiated between the HPLMN and the IPLMN) as may be decided by the CSE operator.

17 CSE related congestion control - $(CAMEL3$)

It shall be possible for the CSE to suppress either all or some CAMEL interrogations from a V/IPLMN, when the V/IPLMN is the subscriber's HPLMN. If there is a bilateral agreement the operators may also apply congestion control between different networks.

The criterion to suppress CAMEL interrogations is one of:

1 called address or,

2 service key or,

3 called address and service key or,

4 calling address and service key.

.

If congestion control prevents contact with the CSE, the V/IPLMN shall proceed in accordance with the Default Call Handling.

Congestion Control is applicable to CAMEL control of circuit switched call. It is not applicable to CAMEL control of GPRS session and PDP context, and to CAMEL control of short message.

18 Interactions with supplementary services

18.1 General

This subclause defines the interactions between supplementary services and the CAMEL feature. However, it should be noted that the most effective way to control those service interactions is through managing the provisioning of services. Where possible, subscribers provisioned with services using the CAMEL feature shall not be provisioned with services having an adverse interaction with the CAMEL based services. supplementary services shall be assumed not to have any knowledge of CAMEL based services.

In general, call independent supplementary service operations (registration, erasure, activation, deactivation and interrogation) are not modified by CAMEL. The exceptions to this for CAMEL phase 2 and later are the call forwarding services, described in subclause 18.3.

18.2 Line Identification

18.2.1 Calling Line Identification Presentation (CLIP)

The CSE shall be able to create or modify an additional calling line identity (additional calling party number) which is presented to the called subscriber via the CLIP supplementary service. There shall be no restriction to the format of the additional calling line identity determined by the CSE.

The CSE shall not be able to modify the calling line identity (calling party number).

18.2.2 Calling Line Identification Restriction (CLIR)

For an MT call, the CSE shall not be able to change the presentation indicator given to the called subscriber via the CLIP supplementary service.

For an MO/MF call, the CSE shall be able to send to the VPLMN/IPLMN an instruction that the presentation indicator of the calling party number shall be set to ”Presentation Restricted”. - $(CAMEL3$)

18.2.3 Connected Line Identification Presentation (COLP)

No interaction. The CSE shall not be able to change the connected line identity.

The CSE shall be able to send an indication that the identity returned to the calling subscriber's serving PLMN as the connected number shall be the called IN number. - $(CAMEL3$)

18.2.4 Connected Line Identification Restriction (COLR)

$(begin$(CAMEL3$)

For an MT call, the CSE shall be able to send to the VPLMN:

- an indication that the presentation indicator of the connected number shall be set to "presentation restricted", or
- an indication that the presentation indicator of the called IN number shall be set to "presentation restricted" (this is coupled with the indication that the identity returned to the calling subscriber's serving PLMN as the connected number shall be the called IN number), or
- an indication that the presentation indicator of the called IN number shall be set to "presentation allowed" (this is coupled with the indication that the identity returned to the calling subscriber's serving PLMN as the connected number shall be the called IN number).

$(end$(CAMEL3$)

18.3 Call Forwarding

$(begin$(CAMEL2$)

For the registration of call forwarding supplementary services the network shall accept any forwarded to number for a subscriber who is provided with a TIF-CSI. In this case the HPLMN shall treat the forwarded-to number transparently at the time of registration, i.e. it shall not perform validity checks or translate the format of the number. The forwarding PLMN shall treat the forwarded-to number transparently when the call forwarding service is invoked. The CSE may modify the forwarded-to number within the MO CAMEL Service provided for the subscriber when the call forwarding service is invoked.

NOTE: Network operators should ensure that the TIF-CSI is provided only to subscribers who are provided with an MO CAMEL service which is capable of translating the registered forwarded-to number.

If the forwarding PLMN does not support CAMEL phase 2, the HPLMN shall consider the call forwarding service as not registered if the forwarded-to number is not stored in international format.

NOTE: If the served subscriber requires invocation of call forwarding services even when the forwarding PLMN does not support CAMEL phase 2, she has to register a forwarded-to number in E.164 international format.

NOTE: Network operators should be aware that unpredictable service behaviour could be experienced if the service events for 'Busy', 'Not Reachable' or 'No Answer' are activated when the corresponding conditional call forwarding supplementary service is active.

$(end$(CAMEL2$)

18.3.1 Call Forwarding Unconditional (CFU)

The Call Forwarding Unconditional service will be invoked after any terminating CAMEL based service. A forwarded call resulting from a Call Forwarding supplementary service may cause invocation of mobile originated CAMEL based services.

18.3.2 Call Forwarding on Busy (CFB)

As for Call Forwarding Unconditional (see subclause 18.3.1).

18.3.3 Call Forwarding on No Reply (CFNRy)

As for Call Forwarding Unconditional (see subclause 18.3.1).

18.3.4 Call Forwarding on Not Reachable (CFNRc)

As for Call Forwarding Unconditional (see subclause 18.3.1).

18.4 Call Completion

18.4.1 Call Hold (CH)

For both originating and terminating calls, the Call Hold service is invoked after the CAMEL feature is invoked. A call created when a call has been put on hold may be subject to the CAMEL feature in the same way as a normal mobile originating call.

$(begin$(CAMEL3$)

When a call is established, the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit Call Hold.

$(end$(CAMEL3$)

18.4.2 Call Waiting (CW)

Incoming, waiting calls are treated by the CSE in the same way as mobile terminating calls which encounter an idle subscriber.

When a call is established the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit Call Waiting for any additional MT calls for the duration of the established call. - $(CAMEL3$)

18.5 MultiParty (MPTY)

A MultiParty call may include one or more call legs subject to CAMEL based services.

$(begin$(CAMEL3$)

If a call leg is subject to CAMEL based services the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit the inclusion of that leg in a Multi-Party call. - $(CAMEL3$)

18.6 Closed User Group (CUG)

The CSE shall decide whether to invoke the CUG supplementary service and shall perform the necessary processing for a Mobile Originated, Mobile Terminated or Forwarded call. When a terminating call with CUG information is received for a CAMEL marked subscriber, if the terminating CAMEL based service attempts to modify the called party number then:

- If the called subscriber subscribes to CUG then the IPLMN shall release the call to the calling party;
- If the called subscriber does not subscribe to CUG then the IPLMN shall continue the call establishment to the modified called party number.

$(begin$(CAMEL3$)

For an MO call, an MF call, or an MT call subject to CAMEL forwarding, the CSE shall be able to instruct the VPLMN/IPLMN to:

- Continue the call establishment with the original CUG information, or
- Use modified CUG information for that call, or
- Remove CUG information from the call (i.e. continue the call as a non-CUG call).

For an MT call which is not subject to CAMEL forwarding, the CSE shall not be able to modify the CUG information for the call.

When an MT call with CUG information is received for a CAMEL marked subscriber, if the terminating CAMEL based service attempts to modify the called party number then:

- If the called subscriber subscribes to CUG then the VPLMN shall release the call to the calling party;

- If the called subscriber does not subscribe to CUG then the VPLMN shall continue the call establishment to the destination defined by the modified called party number.

$(end$(CAMEL3$)

18.7 Advice of Charge (AoC)

Advice of Charge is not guaranteed to operate correctly for calls subject to CAMEL phase 1 based services. It is recommended that subscribers are not provisioned with Advice of Charge and any CAMEL based service for which there is an adverse interaction.

If CAMEL phase 2 or higher is supported and the phase 2 charging function "CSE controlled e-values" is used, the VPLMN shall use the received e-values from the CSE for the purpose of the AoC supplementary service. Once the VPLMN has received e-values from the CSE, only CSE provided e-values are applicable for this call. The e-values shall be sent by the VPLMN to the MS only if the served subscriber is provided with the AoC supplementary service according to TS 22.086. CAMEL phase 2 allows the CSE to modify e-values for MO calls only. - $(CAMEL2$)

CAMEL phase 3 allows the CSE to modify e-values for MO and MT calls. - $(CAMEL3$)

18.8 Call Barring

NOTE: CAMEL may be used to establish forwarded-legs and CAMEL based re-routing-legs which violate conditional outgoing call barring and ODB services. Network operators should take care to avoid problems which may arise because of this interaction. - $(CAMEL2$)

18.8.1 Barring of all outgoing calls

18.8.1.1 Mobile originated calls

No interaction. The Barring of all outgoing calls supplementary service will be invoked. Thus, originating CAMEL based services will not be invoked.

18.8.1.2 Forwarded Calls

No interaction. If the Barring of all outgoing calls supplementary service is active and operative, it shall prevent the registration or activation of Call Forwarding as specified in TS 22.082.

18.8.1.3 Mobile Originated Short Message Service - $(CAMEL3$)

No interaction. The Barring of all outgoing calls supplementary service will be invoked. No CAMEL service for Mobile Originated SMS will be invoked.

18.8.2 Barring of outgoing international calls

18.8.2.1 Mobile originated calls

Any originating CAMEL based services shall be invoked before the Barring of outgoing international calls supplementary service.

18.8.2.2 Forwarded Calls

No interaction. The interaction between call forwarding and call barring is not modified by CAMEL. This means that the interaction is applied prior to the invocation of call forwarding. When call forwarding is invoked (possibly with originating CAMEL services in the forwarding leg) then the VPLMN or IPLMN shall not apply outgoing call barring services.

$(begin$(CAMEL2$)

If the served subscriber is provided with TIF-CSI the network shall not check the interaction of call forwarding services with this barring program, i.e.:

- The registration or activation of Call Forwarding is accepted even if this barring program is active and operative;
- The activation of this barring program is accepted even if a Call Forwarding supplementary service is active.

When Call Forwarding is invoked (possibly with originating CAMEL services in the forwarding leg) the VPLMN or IPLMN shall not invoke outgoing Call Barring services.

$(end$(CAMEL2$)

NOTE: This behaviour means that CAMEL may be used to establish forwarded-legs which violate conditional outgoing call barring and ODB services. Network operators should take care to avoid problems which may arise because of this interaction. - $(CAMEL1$)

18.8.2.3 Mobile Originated Short Message Service - $(CAMEL3$)

No interaction. The CAMEL Service for Mobile Originated SMS shall be invoked before the Barring of outgoing international calls supplementary service.

18.8.3 Barring of outgoing international calls except those directed to the HPLMN country

As for Barring of outgoing international calls (see subclause 18.8.2).

18.8.4 Barring of all incoming calls

No interaction. The Barring of all incoming calls supplementary service shall be invoked. Thus, terminating CAMEL based services will not be invoked.

18.8.5 Barring of incoming calls when roaming

Same as Barring of all incoming calls (see subclause 18.8.4).

18.9 Explicit Call Transfer (ECT)

One or both call legs of an ECT call may be subject to CAMEL based services.

If a call leg is subject to CAMEL based services the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit the inclusion of that leg in an explicitly transferred call. - $(CAMEL3$)

18.10 Completion of Call to Busy Subscriber (CCBS)

When a call is established the CSE shall be able to instruct the VPLMN/IPLMN whether Subscriber A is prohibited from activating a CCBS request if a subsequent "CCBS possible" indication is received from the destination network or the terminating served subscriber is busy. - $(CAMEL3$)

18.11 Call Deflection

When an MT call is established the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit Call Deflection. - $(CAMEL3$)

19 Interactions with Operator Determined Barring (ODB)

19.1 Barring of all outgoing calls

Same principle as for subclause 18.8.1.

19.2 Barring of all outgoing international calls

Same principle as for subclause 18.8.2.

19.3 Barring of all outgoing international calls except those directed to the home PLMN country

Same principle as for subclause 18.8.3.

19.4 Barring of outgoing calls when roaming outside the home PLMN country

If the subscriber is outside her home PLMN country the Barring of outgoing calls when roaming outside the home PLMN country service will be invoked. Thus, originating CAMEL based services will not be invoked.

19.5 Barring of outgoing inter-zonal calls

Same principle as for subclause 18.8.2.

19.6 Barring of outgoing inter-zonal calls except those directed to the home PLMN country

Same principle as for subclause 18.8.2.

19.7 Barring of outgoing international calls except those directed to the home PLMN country AND barring of outgoing inter-zonal calls

Same principle as for subclause 18.8.2.

19.8 Barring of outgoing premium rate calls

Same principle as for subclause 19.2. The serving network analyses the destination number to determine whether the destination corresponds to a premium rate number. The handling will be the same both for Premium rate information and Premium rate entertainment.

19.9 Barring of incoming calls

Same principle as for subclause 18.8.4.

19.10 Barring of incoming calls when roaming outside the home PLMN country

Same principle as for subclause 18.8.5.

19.11 Barring of incoming calls when roaming outside the zone of the home PLMN country

Same principle as for subclause 18.8.5.

19.12 Operator Specific Barring

No interaction. Any originating or terminating CAMEL based services shall be invoked before Operator Specific Barring of type 1,2,3,4. Operator Specific Barring is applicable only when the subscriber is registered in the HPLMN.

NOTE: Operators should be aware of this interaction when defining Operator Specific ODB categories.

19.13 Barring of Supplementary Services Management

No interaction.

19.14 Barring of registration of forwarded-to numbers

No interaction. The HPLMN will apply the barring of registration of the forwarded-to number as specified in TS 22.041 and TS 23.015.

If the served subscriber is provided with TIF-CSI the HPLMN shall not check the forwarded-to number; hence only the category Barring of registration of any call forwarded-to number will take effect. - $(CAMEL2$)

19.15 Barring of invocation of call transfer

No interaction. The serving network will apply the barring of invocation of call transfer as specified in TS 22.041 and TS 23.015 after any CAMEL handling of the call legs to be joined by the ECT invocation.

If the CSE instructs the serving network to bar the invocation of call transfer involving a specific call leg, this instruction shall have priority over the possible Operator Determined Barring of invocation of call transfer. - $(CAMEL3$)

20 Interactions with Optimal Routeing (OR)

Invocation of OR shall not have any impact on any CAMEL based services.

If OR is applied to a late Call Forwarding then the interrogating PLMN shall invoke a mobile originated CAMEL based service, if required for the served subscriber.

$(begin$(CAMEL2$)

If OR of a basic mobile-to-mobile call is invoked, mobile originating services based on CAMEL phase 2 which rely on the destination of the MO call leg being determined by the dialled number (in particular, prepayment services) will not necessarily operate correctly.

If OR of late call forwarding is invoked from an IPLMN which is also the forwarding subscriber's HPLMN, then mobile terminating services based on CAMEL phase 2 which rely on the destination of the leg from the IPLMN being determined by the MSRN (in particular, prepayment services) will not necessarily operate correctly.

$(end$(CAMEL2$)

$(begin$(CAMEL3$)

If a call is subject to basic OR, VPLMN-A shall pass the address defining the ultimate destination of the call (whether VPLMN-B, HPLMN-B or the forwarded-to destination) to the CSE of the originating subscriber.

If a call is subject to OR of late call forwarding from an IPLMN which is also the forwarding subscriber's HPLMN, then the IPLMN shall pass the forwarded-to number to the CSE which handles mobile terminating CAMEL-based services for the forwarding subscriber.

$(end$(CAMEL3$)

Specific interaction is described in TS 22.079 [2].

21 Void

22 Location Information

The purpose of this procedure is to obtain the location of a particular subscriber. The resolution of the location information may be based on the Cell Identity or Service Area Identity - ($CAMEL3$) of the subscriber's location, or may be based on more accurate positioning information.

The CSE may interrogate the HLR in order to obtain a particular subscriber's location based on the cell identity or service area identity.

The HLR may return location information as defined in TS 23.018 [9].

The HLR may return information based on the current service area identity or cell identity as a result of paging the subscriber. - ($CAMEL3$)

The CSE may interrogate the GMLC in order to obtain a particular subscriber's current location based on accurate geographical information as defined by LCS in TS 22.071 [8]. The GMLC has the possibility to reject any interrogation from any CSE. - ($CAMEL3$)

23 Cross Phase compatibility with future Phases of CAMEL

Where different entities support different phases of CAMEL they shall operate at the highest common phase. CAMEL phase 1 is the lowest common phase.

Annex A (normative): Information tables

A.1 Information provided to the CSE

The following table shows the information which is sent to the CSE at various events. The numbers reflect the applicable CAMEL phase (1, 2, 3).

	Call set-up request procedure 1 (section 5.3.1 for MO calls)	Call set-up request procedure 2 (section 5.3.1 for CF calls)	Call set-up request procedure 3 (section 5.3.2.1 for MO calls	Call set-up request procedure 4 (section 5.3.2.1 for CF calls	Unsuccessful call establishment (MO)	Unsuccessful call establishment (MT)	Incoming call request procedure	Procedures for serving network dialled services 1 (section 7.1 MO calls)	Procedures for serving network dialled services 2 (section 7.1 CF calls)
Event met	1	1	3	3	3	3	1	3	3
IMSI	1	1	3	3	3	3	1	3	3
Calling Party Number	1	1	3	3	3	3	1	3	3
Calling Party Category	1	1	3	3	-	3	1	3	3
Additional Calling Party Number	-	1	-	3	-	3	1	-	3
Called Party BCD Number	1	-	3	-	3	-	-	3	-
Called Party Number	-	1	-	3	-	3	1	-	3
Original Called Party Number	-	1	-	3*1	-	3	1	-	3*1
Redirecting (Party) Number	-	1	-	3	-	3	1	-	3
Redirection Information	-	1	-	3	-	3	1	-	3
Service Key	1	1	3	3	3	3	1	3	3
ISDN Bearer Capability	1	1	3	3	3	3	1	3	3
High Layer Compatibility	1	1	3	3	3	3	1	3	3
Basic Service Code	1	1	3	3	3	3	1	3	3
Call Identification Information	1	1	3	3	3	-	-	3	3
Location Information of the Calling Subscriber	1	-	3	-	3	-	-	3	-
Location Number of the Calling Subscriber	-	-	-	-	-	3	1	-	-
Location information of the called subscriber	-	-	-	-	-	3	1	-	-
Subscriber State of the called subscriber	-	-	-	-	-	3	1	-	-
Cause	-	-	-	-	3	3	-	-	-
Time and Time Zone Information	2	2	3	3	3	3	2	3	3
Calling Party LSA (if available)	3	-	3	-	-	-	-	3	-
NAEA Carrier Identification Code (CIC)	2	2	3	3	3	3	2	3	3

NAEA Carrier Selection Information (pre-subscribed or on-demand)	2	2	3	3	3	-	2	3	3
CUG Index if received from the calling subscriber	3	-	-	-	-	-	-	-	-
CUG Interlock Code	-	3	-	-	-	-	3	-	-
CUG Outgoing Access Indicator	-	3	-	-	-	-	3	-	-

Table A-1: Information transferred towards the CSE

*1: If any other CAMEL dialogue has modified the called party number then the modified number is reported to the CSE of dialled services.

A.2 Information sent by the CSE

The following table shows the information which is sent by the CSE at various events. The numbers reflect the applicable CAMEL phase (1, 2, 3).

	Call set-up request procedure 1 (section 5.3.1)	Call set-up request procedure 2 (section 5.3.2.2)	Unsuccessful call establishment (MO)	Call disconnection procedure (MO)		Incoming call request procedure	Unsuccessful call establishment (MT)	Call disconnection procedure (MT)	Procedures for serving network dialled services	
Called Party Number	1	3	2	2		1	2	2	3	
Calling Party Number	-	-	-	-		-	-	-	-	
Calling Party Category	1	3	2	2		1	2	2	3	
Calling IMSI	-	-	-	-		-	-	-	-	
ISUP CUG information	-	-	-	-		-	-	-	-	
Additional Calling Party Number	1	3	2	2		1	2	2	3	
Original Called Party Number	1	3	2	2		1	2	2	3	
Redirection Party Number	1	3	2	2		1	2	2	3	
Redirection Information	1	3	2	2		1	2	2	3	
Alerting Pattern	-	-	-	-		2	-	-	-	
ISDN Access related Information	-	-	-	-		-	-	-	-	
ISDN Bearer Capability	-	-	-	-		-	-	-	-	
High Layer Compatibility	-	-	-	3		-	-	-	-	
Basic Service Code	-	-	-	3		-	-	-	-	
Called Party to be Created	-	-	-	-		-	-	-	-	
New Call Segment	-	-	-	-		-	-	-	-	
In Service Compatibility Response	-	-	-	-		-	-	-	-	
Service Interaction Indicators Two	-	-	-	-		-	-	-	-	
Location Number	-	-	-	-		-	-	-	-	
NAEA Carrier Identification Code (CIC)	2	2	2	2		2	2	2	3	
NAEA Carrier Selection Information (pre-subscribed or on-demand)	2	2	2	2		2	2	2	3	
NAEA Originating Line Identification (OLI)	2	2	2	2		2	2	2	3	
NAEA Charge Number (CN) - $(CAMEL2$)	2	2	2	2		2	2	2	3	
CSE Address	-	-	-	-		-	-	-	-	
CUG Interlock Code	3	3	-	-		3	-	-	-	

CUG Outgoing Access Indicator	3	3	-	-		3	-	-	-	
Service Interaction Indicators	3	3	-	-		3	-	-	-	

Table A-2: Information sent by the CSE

A.3 GPRS Information provided to the CSE

Table A-3 shows the information which shall be reported to the CSE at various GPRS events. The numbers reflect the applicable CAMEL phase (3).

	Attach	PDP Context Establishment (Initial Service Event)	PDP Context Establishment (Subsequent Service Event)	PDP Context Establishment Ack (Initial Service Event)	PDP Context Establishment Ack (Subsequent Service Event – PDP Context relationship)	PDP Context Establishment Ack (Subsequent Service Event – GPRS Session Relationship I) – **note 1**	PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship II) – **note 2**
Event met	3	3	3	3	3	3	3
Type of monitoring	-	-	3	-	3	3	3
MSISDN	3	3	-	3	-	-	-
IMSI	3	3	-	3	-	-	-
Service Key	3	3	-	3	-	-	-
Location information, at least to the resolution of Routing Area of the attaching subscriber	3	3	3	3	-	3	-
Time stamp information	3	3	3	3	-	3	-
Time zone information	3	3	3	3	-	3	-
GPRS MS Class (**note 3**)	3	3	-	3	-	-	-
PDP transport protocol, i.e. IP or X.25	-	3	3	3	-	3	-
Quality of Service (requested)	-	3	3	3	-	3	-
Quality of Service (subscribed)	-	3	3	3	-	3	-
Quality of Service (negotiated)	-	-	-	3	3	3	3
Destination address information	-	3	3	3	-	3	-
GPRS charging ID	-	-	-	3	3	3	3
GGSN Address	-	-	-	3	3	3	3

Table A-3: GPRS Information transferred towards the CSE

Note 1: PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship I): The PDP Context Establishment event for this PDP Context has not been reported.

Note 2: PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship II): The PDP Context Establishment event for this PDP Context has been reported.

Note 3: GPRS MS Class: Subparameter MS RadioAccessCapability is not supported in UMTS Network.

Table A-4 shows the information which shall be reported to the CSE at the Change of Position events. The numbers reflect the applicable CAMEL phase (3).

Table A-4: GPRS Information reported to the CSE

	Intra Change of Position PDP Context, (Subsequent Service Event)	Intra Change of Position Session (Subsequent Service Event)	Inter Change of Position PDP Context, (Initial Service Event)	Inter Change of Position Session (Initial Service Event)
Event met	3	3	3	3
Type of monitoring	3	3	-	-
MSISDN	-	-	3	3
IMSI	-	-	3	3
Service Key	-	-	3	3
Location information, at least to the resolution of Routing Area of the attached subscriber	3	3	3	3
Time stamp information	-	-	3	3
Time zone information	-	-	3	3
GPRS MS Class (**note 1**)	-	-	3	3
PDP transport protocol, i.e. IP or X.25	-	-	3	-
Quality of Service (requested)	-	-	3	-
Quality of Service (subscribed)	-	-	3	-
Quality of Service (negotiated)	-	-	3	-
Destination address information	-	-	3	-
GPRS Charging ID	-	-	3	-
GGSN Address	-	-	3	-

Note 1: GPRS MS Class: Subparameter MS RadioAccessCapability is not supported in UMTS Networks.

Annex B (informative): Change history

Change history										
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**
Jun 1999			02.78					Transferred to 3GPP SA1	8.0.0	
SA#04			22.078					Version 3.0.0 Approved		3.0.0
SP-05	SP-99443	S1-99268	22.078	001		R99	F	CAMEL control of packet switched MO SMS	3.0.0	3.1.0
SP-05	SP-99443	S1-99272	22.078	002		R99	C	CAMEL control of packet switched MO SMS	3.0.0	3.1.0
SP-05	SP-99443	S1-99290	22.078	003		R99	C	CSE related overload control	3.0.0	3.1.0
SP-05	SP-99443	S1-99333	22.078	004		R99	F	Clarify the serving network behaviour when instructions from the CSE are received.	3.0.0	3.1.0
SP-05	SP-99443	S1-99338	22.078	005		R99	C	Inclusion of Service Key in Mobility Management event notifications + editorial modifications	3.0.0	3.1.0
SP-05	SP-99443	S1-99339	22.078	006		R99	F	Clarification the behaviour when network provided dialled services are used.	3.0.0	3.1.0
SP-05	SP-99443	S1-99341	22.078	007		R99	F	Correct the unsuccessful call establishment procedure for MT calls	3.0.0	3.1.0
SP-05	SP-99443	S1-99342	22.078	008		R99	F	GSM 02.78 Clean-up of CAMEL phase information	3.0.0	3.1.0
SP-05	SP-99443	S1-99345	22.078	009		R99	F	Clarification on the type of number used by mobile stations.	3.0.0	3.1.0
SP-05	SP-99443	S1-99590	22.078	010		R99	D	Editorial update of references for GSM/3GPP use.	3.0.0	3.1.0
SP-05	SP-99443	S1-99594	22.078	011		R99	B	CAMEL3 interworking with GPRS; Change of position	3.0.0	3.1.0
SP-05	SP-99443	S1-99596	22.078	012		R99	C	CAMEL3 DTMF Mid-Call corrections and clarifications	3.0.0	3.1.0
SP-05	SP-99443	S1-99597	22.078	013		R99	F	CAMEL3 clean-up of IPLMN and VPLMN references	3.0.0	3.1.0
SP-05	SP-99443	S1-99598	22.078	014		R99	C	Defining successful SM submission to SMSC as EDP (CAMEL3)	3.0.0	3.1.0
SP-05	SP-99443	S1-99673	22.078	015		R99	F	Interworking with SAT and MExE !	3.0.0	3.1.0
SP-05	SP-99443	S1-99675	22.078	016		R99	F	Correction Annex A.2; Information sent by the CSE	3.0.0	3.1.0
SP-05	SP-99443	S1-99677	22.078	017		R99	F	Corrections to CAMEL interworking with GPRS	3.0.0	3.1.0
SP-05	SP-99443	S1-99681	22.078	018		R99	C	Short Message Submission Handling	3.0.0	3.1.0
SP-05	SP-99443	S1-99684	22.078	019		R99	C	Removing the restriction on the total number of trigger criteria.	3.0.0	3.1.0
SP-05	SP-99443	S1-99686	22.078	020		R99	C	Removing the 40-octet restriction of free format data	3.0.0	3.1.0
SP-05	SP-99443	S1-99689	22.078	021		R99	C	Defining Successful SM submission and Unsuccessful SM submission as EDP-N and EDP-R.	3.0.0	3.1.0
SP-05	SP-99443	S1-99770	22.078	022		R99	C	CAMEL3 corrections to new Trigger Detection Points (TDP)	3.0.0	3.1.0
SP-05	SP-99443	S1-99771	22.078	023		R99	C	Description of CAMEL Subscription Information	3.0.0	3.1.0
SP-05	SP-99443	S1-99773	22.078	024		R99	F	CAMEL3 corrections and clarifications to dialled services (subscribed & serving network)	3.0.0	3.1.0
SP-05	SP-99443	S1-99774	22.078	025		R99	D	Charging clarifications for MO-SMS	3.0.0	3.1.0
SP-05	SP-99443	S1-99775	22.078	026		R99	B	CAMEL3 Call Forwarding and new TDP interworking	3.0.0	3.1.0
SP-05	SP-99443	S1-99776	22.078	027		R99	C	Support For MSP Phase 2	3.0.0	3.1.0
SP-05	SP-99443	S1-99777	22.078	028		R99	B	Addition of CCBS to the SS Invocation Notification	3.0.0	3.1.0
SP-05	SP-99443	S1-99772	22.078	029		R99	F	Clarification the behaviour when network provided dialled services are used	3.0.0	3.1.0
SP-06	SP-99526	S1-991048	22.078	030	1	R99	B	CSE ability to change CLI PI for an MO call	3.1.0	3.2.0
SP-06	SP-99526	S1-991035	22.078	031		R99	B	Enhancement of the capabilities of dialled services	3.1.0	3.2.0
SP-07	SP-000062	S1-000095	22.078	032	1	R99	F	Call gapping / congestion control in HPLMN only	3.2.0	3.3.0
SP-07	SP-000062	S1-000065	22.078	033		R99	F	In-band user interaction for dialled services in CAMEL ph3	3.2.0	3.3.0
SP-07	SP-000062	S1-000159	22.078	034		R99	F	Correction of GPRS session description	3.2.0	3.3.0

Change history										
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**
SP-07	SP-000062	S1-000167	22.078	035		R99	F	Reduced scope of CAMEL Phase 3 in release 99	3.2.0	3.3.0
SP-07	SP-000123	S1-000158	22.078	036		R99	F	Correction of announcement capabilties	3.2.0	3.3.0
SP-08	SP-000198	S1-000232	22.078	037		R99	F	Correction to the reduced scope of CAMEL Phase 3 in release 99 – enhancements to call forwarding	3.3.0	3.4.0
SP-08	SP-000198	S1-000247	22.078	038		R99	F	Correction to the reduced scope of CAMEL Phase 3 in release 99 – deletion of MexE / SAT free format data parameter in Annex A.1	3.3.0	3.4.0
SP-08	SP-000198	S1-000251	22.078	039		R99	F	Correction to description of subscriber dialled services	3.3.0	3.4.0
SP-08	SP-000198	S1-000252	22.078	040		R99	F	Clarification for conditional triggering for subscribed dialled services	3.3.0	3.4.0
SP-08	SP-000198	S1-000255	22.078	041		R99	C	Removal of NPI from conditional triggering	3.3.0	3.4.0
SP-08	SP-000198	S1-000395	22.078	042		R99	D	Corrections to Interactions with Supplementary Services	3.3.0	3.4.0
SP-08	SP-000198	S1-000396	22.078	043		R99	D	Removal of question marks from the A.1 information flow table	3.3.0	3.4.0
SP-08	SP-000198	S1-000402	22.078	044		R99	D	Definition of Geodetic Information	3.3.0	3.4.0
SP-08	SP-000198	S1-000403	22.078	045		R99	D	Distinction between initial and subsequent service events	3.3.0	3.4.0
SP-08	SP-000198	S1-000404	22.078	046		R99	D	Update of CAMEL roaming issues (section 16)	3.3.0	3.4.0
SP-08	SP-000198	S1-000390	22.078	047		R99	D	Removal of Editor's notes and corrections to Annex 1	3.3.0	3.4.0
SP-08	SP-000198	S1-000445	22.078	048	2	R99	D	CR to 22.078 R99 on Corrections to CAMEL interworking with GPRS re3	3.3.0	3.4.0
-	-	-	22.078	-	-	-	-	Editorial update to replace Release 2000 with Release 1999 on Title Page	3.4.0	3.4.1
SP-09	SP-000374	S1-000506	22.078	049		R99	F	Removal of user interaction at answer DPs (Release 99)	3.4.1	3.5.0
SP-09	SP-000374	S1-000540	22.078	060		R99	F	GPRS AC/ACR alignment of shared data volume control (Stage 1 vs. 2)	3.4.1	3.5.0
SP-09	SP-000381	S1-000638	22.078	050		R4	D	Change of MExE name	3.4.1	4.0.0
SP-10	SP-000537	S1-000855	22.078	065		R99	F	Introduction of GGSN Address	3.5.0	3.6.0
SP-10	SP-000698		22.078	062	5	R99	F	Alignment with stage 2 & 3, and editorial clarification	3.5.0	3.6.0
SP-10	SP-000536	S1-000810	22.078	071		R99	A	Support of CAMEL Phase 1 and 2	3.5.0	3.6.0
SP-10	SP-000698		22.078	072	1	R99	F	Removal of Volume charging for GPRS Session	3.5.0	3.6.0
SP-11	SP-010045	S1-010104	22.078	075	2	R99	F	Remedy for incorrect implementation of CR 22.078-062r5	3.6.0	3.7.0
SP-11	SP-010046	S1-010107	22.078	076	1	R99	F	Support of previous phases of CAMEL	3.6.0	3.7.0
SP-11	SP-010050	S1-010188	22.078	085	3	R99	F	Corrections of congestion control procedure	3.6.0	3.7.0
SP-11	SP-010047	S1-010116	22.078	092	2	R99	F	Interaction between CAMEL control of MO-SMS and Call Barring & ODB	3.6.0	3.7.0
SP-11	SP-010048	S1-010113	22.078	095		R99	F	Correction of interaction between CAMEL and BOIC	3.6.0	3.7.0

History

Document history		
V3.2.0	January 2000	Publication
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