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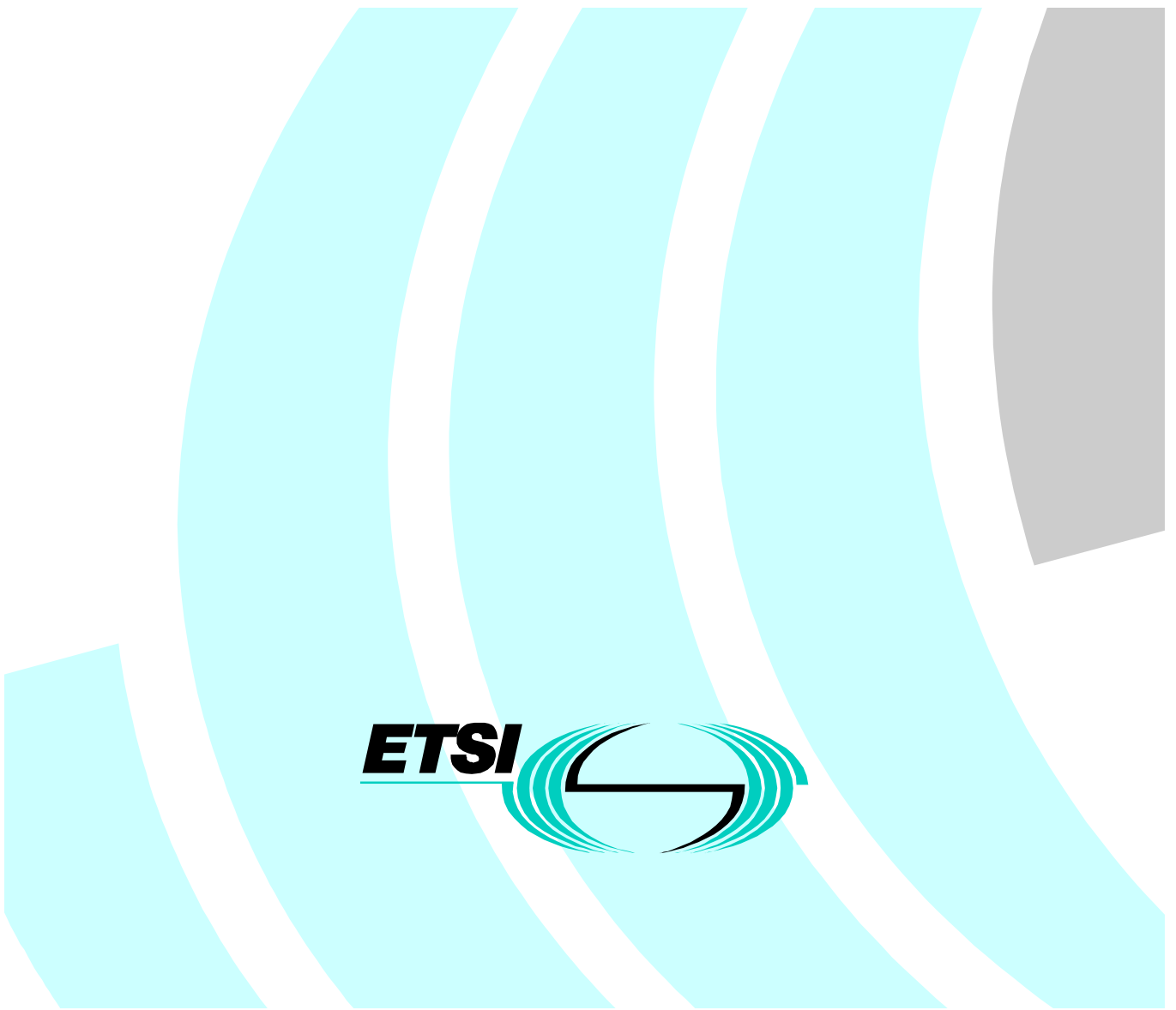
Technical Specification
**Digital cellular telecommunications system (Phase 2+);
Customised Applications for Mobile network Enhanced
Logic
(CAMEL);
Service definition - Stage 1
(GSM 02.78 Version 8.0.0 Release 1999)**

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Foreword

This ETSI Technical Specification (TS) has been produced by the Special Mobile Group (SMG) of the European Telecommunications Standards Institute (ETSI).

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 digital cellular telecommunications system.

The contents of this TS are subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of this TS it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 8.x.y

where:

- 8 indicates GSM Release 1999 of Phase 2+
- y the third digit is incremented when editorial only changes have been incorporated in the specification;
- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

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 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 that are only applicable to phase 1 are characterised with the formal designator - \$(CAMEL1\$)
- CAMEL phase 2. It is characterised where necessary with the formal designation - \$(CAMEL2\$) and sometimes with an indication of CAMEL phase 2. - \$(CAMEL2\$)
- CAMEL phase 3. It is characterised where necessary with the formal designation - \$(CAMEL3\$) and sometimes with an indication of CAMEL phase 2. - \$(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, to the control of HLR subscriber data, to control different call party connections, to the control of network signalling load and, - \$(CAMEL3\$);
- as a CAMEL Phase 3 function, to CSE created calls - \$(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 enhance the capabilities of phase 1 and are included in this standard. Following capabilities are added:

- Additional event detection points.
- Interaction between a user and 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 GSM supplementary services (ECT, CD, MPTY).
- For easy postprocessing, charging information from a serving node can be integrated in normal call records.

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

- Capabilities for enhanced handling of call party connections, together with the ability to handle more than 2 parties in a call
- Support of facilities to avoid overload situations.
- Capabilities to support Dialed Services.
- Capabilities to handle mobility events, such as (Not-)reachability and roaming.
- Control of GPRS sessions.

- Control of mobile originating SMS.
- Support of SoLSA. Support of Localised Service Area interworking is an optional feature. The support for interworking with mobile terminating calls is a requirement, however the specific details of how this will be realised is for further study - \$(CAMEL3\$)

Detailed information can be found in the respective sections.

2 Normative references

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are for Release 1999 versions (version 8.x.y).

- [1] GSM 02.93: "Digital cellular telecommunication system (Phase 2+); "Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".
- [2] GSM 02.79: "Digital cellular telecommunication system (Phase 2+); "Support of Optimal Routeing (SOR); Service definition (Stage 1)".
- [3] GSM 02.30: "Digital cellular telecommunication system (Phase 2+); "Man-machine Interface (MMI) of the Mobile Station (MS) (Stage 1)".
- [4] GSM 02.90: "Digital cellular telecommunication system (Phase 2+); "Stage 1 Decision of Unstructured Supplementary Service Data (USSD)".
- [5] GSM 02.97: "Digital cellular telecommunication system (Phase 2+); "Multiple Subscriber Profile (MSP); Service definition (Stage 1)".
- [6] GSM 02.60: "Digital cellular telecommunication system (Phase 2+); "General Packed Radio Service (GPRS); Service definition (Stage 1)".
- [7] GSM 02.57: "Digital cellular telecommunication system (Phase 2+); "Mobile Station Execution Environment (MExE); Service definition (Stage 1)".

3 Definitions and abbreviations

Operator Specific Service (OSS): Any service offered to a GSM / UMTS mobile user that is not standardised by the GSM specifications.

Interrogating PLMN (IPLMN): This is the PLMN that performs the interrogation of the HPLMN for information on the treatment of a terminating call.

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

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

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

Network CAMEL Service Information (N-CSI): The N-CSI identifies services offered on a per-network basis by the serving PLMN operator for all subscribers. - \$(CAMEL3\$)

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

CAMEL Subscription Information (CSI): The 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.

These OSS may include both services provisioned for individual subscribers and services provisioned equally for all subscribers of an HPLMN. - \$(CAMEL3\$)

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

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

- **Geographical information** (longitude and latitude) when Cell ID or Location Area Code is known) this 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 resolution and accuracy of the indicated location information may also be provided.
- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.
- **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:** any MS that is not CAMEL-busy or network determined not reachable.

GPRS attach: Is the period where the GPRS subscriber is registered to the GPRS data network. - \$(CAMEL3\$)

GPRS session: A session starts when a GPRS subscriber activates the start to send or receive data packets and ends when the subscriber deactivates the PDP transport. - \$(CAMEL3\$)

PDP: Packet Data Protocol (as defined in GSM 02.60 [6]) - \$(CAMEL3\$)

Route select failure: - \$(CAMEL3\$)

[test to be added]

Carrier Identification Code: Identifies uniquely the Carrier (NAEA). - \$(CAMEL3\$)

Carrier Selection Information: Is an indication whether the subscriber selected a carrier, or the carrier is predefined for the subscriber (NAEA). - \$(CAMEL3\$)

Originating Line Identification: Identifies uniquely the subscriber to be charged for the usage of the carrier (NAEA). - \$(CAMEL3\$)

Charge Number: Identifies uniquely the organisation to be charged for the usage of the carrier (NAEA). - \$(CAMEL3\$)

NAEA: North American Equal Access (NAEA). - \$(CAMEL3\$)

Subscribed Dialed Services: Identifies a set of maximum of ten service numbers. These service numbers are globally available to all HPLMN subscribers. No subscription is needed to access the service numbers within the HPLMN. Each service number is chosen on the HPLMN operators discretion. In the case of international roaming, the set of service numbers forms a part of the subscribers profile. - \$(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

The CAMEL Subscription Information (CSI) is provided by the HPLMN operator by administrative means.

The CSI may include the Translation Information Flag (TIF-CSI). If present for a subscriber the network will apply special handling of the call forwarding supplementary service. For details refer to section 12.3 \$(CAMEL2\$).

The Network CAMEL Service Information (N-CSI) for network-based services is provided by the serving PLMN operator. The provisioning mechanism is out of the scope of this specification. -\$(CAMEL3\$).

4.2 General Procedures

Each GSM 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 process and make contact with a CSE to ask for instructions or to send a notification. When a service event occurs, 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, and the corresponding CSE identity, which can initiate contact with the CSE is defined in the CAMEL Subscription 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; or - \$(CAMEL3\$);
- the CSE creates a call - \$(CAMEL3\$).

In addition dialed services may be applicable in a PLMN if the N-CSI is active in the PLMN. -\$(CAMEL3\$)

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

- Activate further service events for potential invocation. These events shall remain active only for the life-time 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\$);
- Create additional parties in the call - \$(CAMEL3\$);
- Change the configuration of the connections between call parties - \$(CAMEL3\$).

\$(begin\$(CAMEL3\$)

It shall be possible in the case of subscribed dialled services for the CSE to instruct the serving PLMN to:

- Continue the processing of the call, or;
- Connect the calling party to a specified called party;

After one of the above instructions, the relation between the serving network and the CSE shall be released.

It should be possible in the case of serving network-based services to:

- Continue the processing of the call, or;
- Connect the calling party to a specified called party.

Any other behaviour may cause misoperation of CAMEL based services.

\$(end\$(CAMEL3\$)

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

- MT call;
- MO call (forwarded calls are treated as MO calls);
- supplementary service invocation -\$(CAMEL2\$);
- USSD user interaction. The of service codes for CAMEL services can be allocated on subscriber basis or globally for all subscribers of the HPLMN. -\$(CAMEL2\$);
- MO SM service \$(CAMEL3\$).

As part of an OSS it shall be possible for the CSE to interrogate for information about a particular subscriber at any time.

It shall be possible for the CSE to originate calls on behalf of a CAMEL subscriber - \$(CAMEL3\$).

4.3 Applicability of CAMEL to Basic Services

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

CAMEL procedures are applicable to GPRS session \$(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 GSM 03.78 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;
- Analysis of dialled digits;
- Detection of unsuccessful call establishment.
Unsuccessful call establishment may be caused by:
 - called subscriber busy;
 - called subscriber not reachable;
 - no answer from called subscriber;
 - route select failure.

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. Only one of the above initial service event is indicated for each OSS.

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 in "unknown" or "international" format.);
 - 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 basic service codes for individual basic services or basic service groups (the list shall be able to contain at least 5 basic service codes). 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 or not the call must be a forwarded call.

A call is treated as forwarded in this respect when either a GSM 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 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 criteria; 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 in the same format (unknown or international); 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 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 called number string may be in "unknown" or "international" format. 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.

The total number of entries in the dialled number list (5.1.A.1) and the called number list (5.1.A.2) shall not exceed 10.

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 in the same format (unknown or international); 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 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 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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon -\$(CAMEL2\$);
 - Unsuccessful call establishment. In case of no answer the CSE may provide a no answer timer - \$(CAMEL2\$); The CSE may specify the distinct unsuccessful case(s) for which the instruction is valid. \$(CAMEL3\$);
 - Mid call event (DTMF). The CSE shall specify the digit string(s) for which the instruction is valid. \$(CAMEL3\$);
 - 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Connect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- 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);
- allow the call processing to continue unchanged;
- allow 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 shall suspend call processing, make contact with the CSE and await further instructions.

Note that contact to 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 has made contact with the CSE (or reported events to the CSE when contact has already been established), the CSE shall be able to instruct the VPLMN to act as described below by issuing one and only one of the following instructions:

- allow the call processing to continue unchanged;
- allow 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).

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.

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

When the VPLMN 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:

- allow the call processing to continue unchanged.

\$(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 initial service event (according to the CSI); and
- the call attempt is unsuccessful; and
- the triggering criteria are satisfied .

Then the VPLMN 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 service event for this call and the unsuccessful call establishment event occurs the VPLMN 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 a initial service event, the information listed in table: A-1 (Unsuccessful call establishment) shall be provided to the CSE additionally if available. - \$(CAMEL3\$)

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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon;
 - Unsuccessful call establishment. In case of no answer the CSE may provide a no answer timer;
 - Mid call event (DTMF) \$(CAMEL3\$);
 - 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Put call parties on hold - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- 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:

- allow the call processing to continue unchanged;
- allow 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)).
- release call

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 service event for this call and the called party connection event occurs the 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 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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Call disconnection;
 - Mid call event (DTMF) \$(CAMEL3\$);
 - 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Put call parties on hold - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- Order in-band user interaction \$(CAMEL3\$).

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;
- allow the call processing to continue unchanged;

5.7 Mid call procedure \$(CAMEL3\$)

When the CSE instructs the VPLMN to arm the mid-call event it shall specify a criterion against which digits entered by the originating subscriber using the DTMF procedure shall be matched.

The criterion consists of a list of up to 3 entries. Each entry is either a digit string or a definition of a range. A range definition consists of a lower bound followed by an upper bound. The lower bound and the upper bound are each digit strings. A digit string shall be at least 1 digit and at most 6 digits. Each digit shall be taken from the ordered set (0 - 9, *, #, A, B, C, D).

When collecting digits, the VPLMN shall consider a digit which follows the first digit of the string to be part of the string only if the interval between successive digits does not exceed 4 seconds.

The criterion for the mid-call DP is satisfied if the digits collected from the subscriber match the digits in a digit string in the criterion, or if the digits collected from the subscriber are included in a range defined in the criterion. Triggering of the mid-call event shall occur immediately after the criterion has been satisfied.

Digits collected from the subscriber shall be relayed as DTMF towards the destination subscriber independent of any CAMEL processing.

If the CSE has activated this service event for this call and a mid-call event (as determined by the criterion for the mid-call procedure being satisfied) occurs the 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;
- event specific data:
 - received DTMF digits.

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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Call disconnection;
 - Mid call event (DTMF);
 - The party in the call for which the event shall be detected and reported (calling or a called party);
 - The type of monitoring (control or notification).
- Create additional parties in the call (refer to Section 'Creation of called parties');
- Put call parties on hold;
- Remove individual call parties from the call;
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call;
- 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 instruction:

- allow the call processing to continue unchanged, or;
- release the call;

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 any party in the call.

If the CSE has activated this service event for this call and the call disconnection event occurs the 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 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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon;
 - Unsuccessful call establishment. In 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Put call parties on hold - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- 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:

- allow the call processing to continue unchanged, i.e. to release the call;

\$(begin\$(CAMEL2\$)

- allow 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));

\$(end\$(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 CSE shall previously have activated any of these service events (with "Type of monitoring" set to control.)

5.10 Creation of called parties \$(CAMEL3\$)

The purpose of this procedure is to allow the CSE to initiate the creation of called parties in the call as long as a controlling relation to the CSE exists.

The CSE shall send a request to initiate a call attempt. In this case the CSE shall always arm all events pertaining to unsuccessful call connection and to answer, and then continue processing of the call attempt before any other activities are performed on the call party created.

The information that it shall be possible to receive in the initiate call attempt request is listed in table: A-2 (Creation of called parties).

Upon receipt of an answer or unsuccessful call establishment event then the event is reported to the CSE.

The following information shall be provided to the CSE:

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

Processing then continues as defined in the following Sections:

- 5.3,
- 5.4,
- 5.5,
- 5.B,
- 5.6, and
- 5.7.

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 GSM 03.78 for complete information element lists.

6.1 Initial service events

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

- Authorisation attempt
- Detection of unsuccessful call establishment.

Unsuccessful call establishment may be caused by:

- called subscriber busy;

- called subscriber not reachable;
- no answer from called subscriber.

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 basic service codes for individual basic services or basic service groups (the list shall be able to contain at least 5 basic service codes). 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 6 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 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 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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon -(CAMEL2\$);

- Unsuccessful call establishment. In case of no answer the CSE may provide a no answer timer \$(CAMEL2\$). The CSE may specify the distinct unsuccessful case(s) for which the instruction is valid. \$(CAMEL3\$);
- Mid call event (DTMF). The CSE shall specify the digit string(s) for which the instruction is valid. \$(CAMEL3\$);
- 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).

\$(begin\$(CAMEL3\$)- activate control service events for the originating call leg. The CSE shall have the possibility to send the following information: :

- The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon;
 - Unsuccessful call establishment. The CSE may specify the distinct unsuccessful case(s) for which the instruction is valid.;
 - Mid call event (DTMF). The CSE shall specify the digit string(s) for which the instruction is valid.
- The party in the call for which the event shall be detected and reported (calling or called party);

\$(end\$(CAMEL3\$)

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

\$(begin\$(CAMEL1\$)

This is only applicable when the called party number is unchanged by the CSE.

\$(end\$(CAMEL1\$)

- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- 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);
- allow the call processing to continue unchanged;
- allow 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).

In the case the CSE instructs the IPLMN to allow the call processing with a changed called party number, the CSE shall indicate whether the resulting call shall be treated by the IPLMN as a forwarded call or not. Any forwarded call resulting from a CSE Call Forwarding service may cause an invocation of any mobile originated CAMEL based service in the IPLMN.

\$(begin\$(CAMEL2\$)

In the case 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.

\$(end\$(CAMEL2\$)

6.4 Calling party abandon \$(CAMEL2\$)

The purpose of this 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 and the calling party abandon event occurs the IPLMN 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 service event for this 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:

- allow the call processing to continue unchanged;

\$(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.

If the CSE has activated this service event for this call and the unsuccessful call establishment event occurs the 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;
- Type of monitoring;
- Cause for unsuccessful call establishment:
 - not reachable;
 - busy;
 - no answer.

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

- perform charging activities;
- activate other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon;
 - Unsuccessful call establishment. In 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Put call parties on hold - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- 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:

- allow the call processing to continue unchanged;
- allow 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)).
- release call

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 service event for this call and the called party connection event occurs, the 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 IPLMN 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 other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - (Call disconnection);
 - Mid call event (DTMF) \$(CAMEL3\$);
 - 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Put call parties on hold - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- order in-band user interaction. - \$(CAMEL3\$);

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;
- allow the call processing to continue unchanged;

6.7 Mid Call procedure \$(CAMEL3\$)

When the CSE instructs the VPLMN to arm the mid-call event it shall specify a criterion against which digits entered by the terminating subscriber using the DTMF procedure shall be matched.

The criterion consists of a list of up to 3 entries. Each entry is either a digit string or a definition of a range. A range definition consists of a lower bound followed by an upper bound. The lower bound and the upper bound are each digit strings. A digit string shall be at least 1 digit and at most 6 digits. Each digit shall be taken from the ordered set (0 - 9, *, #, A, B, C, D).

When collecting digits, the VPLMN shall consider a digit which follows the first digit of the string to be part of the string only if the interval between successive digits does not exceed 4 seconds.

The criterion for the mid-call DP is satisfied if the digits collected from the subscriber match the digits in a digit string in the criterion, or if the digits collected from the subscriber are included in a range defined in the criterion. Triggering of the mid-call event shall occur immediately after the criterion has been satisfied.

Digits collected from the subscriber shall be relayed as DTMF towards the destination subscriber independent of any CAMEL processing.

If the CSE has activated this service event for this call and a mid call event (as determined by the criterion for the mid-call procedure being satisfied) occurs the 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;
- event specific data:
 - received DTMF digits.

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

- perform charging activities
- activate other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Call disconnection;
 - Mid call event (DTMF).
 - The party in the call for which the event shall be detected and reported (calling or a called party);
 - The type of monitoring (control or notification).
- Create additional parties in the call (refer to Section 'Creation of called parties');
- Put call parties on hold;
- Remove individual call parties from the call;
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call;
- 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 instruction:

- allow the call processing to continue unchanged, or;
- release the call

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 service event for this call and the call disconnection event occurs the 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 IPLMN has made contact with the CSE, the CSE shall be able to instruct the IPLMN to act as described below.

- perform charging activities;
- activate other control service events for the call. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Called party connection;
 - Call disconnection;
 - Calling party abandon;
 - Unsuccessful call establishment. In 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).
- Create additional parties in the call (refer to Section 'Creation of called parties') - \$(CAMEL3\$);
- Put call parties on hold - \$(CAMEL3\$);
- Remove individual call parties from the call - \$(CAMEL3\$);
- Reconnect an individual call party or a group of call parties to another call party or group of call parties, within the same call - \$(CAMEL3\$);
- 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:

- allow the call processing to continue unchanged, i.e. to release the call;

\$(begin\$(CAMEL2\$)

- allow 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)).

\$(end\$(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 CSE shall previously have activated at least one of these service events. [with "Type of monitoring" set to control.]

7 Procedures for serving network 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. If this procedure is triggered it shall happen after processing of Subscriber Dialled Services triggered via the CSI.

7.1 Initiation of contact with the CSE

If:

- the PLMN is provisioned with network CAMEL service information (N-CSI); and
- the call set-up request occurs;

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 by issuing one and only one of the following instructions:

- allow the call processing to continue unchanged;
- allow 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).

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 CSE initiated call set up

The purpose of this procedure is to allow the CSE to initiate a call. The CSE shall send a request to initiate a call attempt by creating a connection from the IPLMN/VPLMN to an initial call party. The CSE shall always arm all events pertaining to unsuccessful call connection and to answer, and then the CSE shall request continuation of the call process before any other activities are performed on the initial call party.

The information that it shall be possible to receive in the initiate call attempt request is listed in table: A-2 (CSE initiated call set up).

Upon receipt of an answer or unsuccessful call establishment event then the event is reported to the CSE.

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.

Processing then continues as defined in the section for dialled services.

[Editors Note: The reference has to be checked after inclusion of respective chapter]

9 Procedures for SMS \$(CAMEL3\$)

9.1 Short message submission request procedure

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

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;
- Identity of the originator of the SM (SIM, ME, User);
- SMSC address;
- Calling Party's Number;
- Service Key;
- Location information of the calling subscriber;
- 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 (inclusion in charging record of information received from the CSE);
- activate other control service events for the SM submission. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - Unsuccessful SM submission.

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;
- allow the submission to continue unchanged;
- allow the SMS processing with modified information. The CSE shall have the possibility to send the following information:
 - Called Party Number;
 - Calling Party's Number;
 - SMSC address.

In the case where the SM submission is barred, the served subscriber shall be informed.

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 GSM 03.78 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 Activation / Session Establishment: a subscriber requests the activation of a Packet Data Protocol Context.
- PDP Activation / Session Establishment Acknowledgement: the SGSN has received an acknowledgement from the GGSN for that request.

10.2 Criteria for contact with the CSE

It shall be possible for the HPLMN to specify criteria that must be satisfied before the CSE is contacted. The following criteria may be defined:

10.2.1 CSI criteria applicable at attach, session establishment and session establishment acknowledgement procedure

CSI criteria may be defined for a subscriber both for the case where the GPRS subscriber attaches to the data network, for the case where she starts to set up a data session (PDP activ) and for the case where acknowledgement of data session set-up is received (PDP activation acknowledgement).

Criterion at the attach procedure:

- Capabilities of GPRS MS class;

Criteria on the type of session (applicable at session establishment request and acknowledgement):

- Transfer characteristics; e.g. IP, X.25
- Service characteristics; e.g. Quality of Service
- Identities; e.g. Access Point Name

The criteria may be collectively defined to be either 'enabling trigger criteria' or 'inhibiting trigger criteria'. The HPLMN may choose not to define any criteria.

If:

- Enabling trigger criteria are met, or
- Inhibiting trigger criteria are not met, or
- No trigger criteria are defined

Then criteria permit the contact with the CSE to be established.

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 occurs; and
- criteria permit the contact with the CSE to be established.

then ,the VPLMN shall suspend attach processing, make contact with the CAMEL Service Environment and await further instructions.

The information listed in table: A-3 (Attach procedure) shall be provided to the CAMEL Service Environment, 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 other control service events for the period being attached to the data network. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported:
 - PDP activation/session establishment request;
 - PDP session establishment acknowledgement;
 - Change of position;
 - Data volume threshold (including the type of threshold and when the threshold shall be reached);
 - Attach duration threshold;
 - PDP deactivation;
 - Detach procedure;

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;
- allow the processing to continue unchanged.

10.4 PDP activation / Session Establishment

The purpose of this procedure is to manage a request from the subscriber to activate a Packet Data Protocol. 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
- criteria permit the contact with the CSE to be established,

or, the CSE has activated this service event for the attached subscriber and the PDP activation event occurs then,

- the VPLMN shall suspend processing, make contact with the CSE and await further instructions, or,
- send a notification and continue.

The information listed in table: A-3 (PDP activation / Session Establishment) 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 other control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported (including a session reference number):
 - Change of position
 - PDP session establishment acknowledgement
 - Data Packet Threshold Procedure (including the type of threshold and when the threshold shall be reached)
 - PDP deactivation procedure;
 - Detach procedure;

[Editor's note: Change of QoS is for further study.]

- Perform Charging Activities,

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:

- Release session,
- allow the processing to continue unchanged;
- allow the processing with modified information. The CSE shall have the possibility to send the following information:
 - Access Point Name.

10.5 PDP activation / Session Establishment Acknowledgement

The purpose of this procedure is to manage a request from the subscriber to activate a Packet Data Protocol. Note that multiple contacts to the CSE may be made in parallel due to PDP activation / session establishment acknowledgement events being detected whilst a GPRS subscriber is attached to the GSM 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 / session establishment acknowledgement is set as a trigger detection point; and
- criteria permit the contact with the CSE to be established,

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

The information listed in table: A-3 (PDP activation / Session Establishment Acknowledgement) 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 other control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported (including a session reference number):

- Change of position
- Data Packet Threshold Procedure (including the type of threshold and when the threshold shall be reached)
- PDP deactivation procedure;
- Detach procedure;

[Editor's note: Change of QoS is for further study.]

- Perform Charging Activities,

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:

- Release session,
- allow the processing to continue unchanged;

10.6 Change of Position Procedure (for further study)

The purpose of this procedure is to detect a request from the GPRS subscriber for update the actual routing area, i.e. to change from one SGSN to another SGSN.

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

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

- Event met;
- New routing area;

10.7 Data Packet Threshold Procedure

The purpose of this procedure is to control the amount of data transferred to and from the served subscriber. The threshold is valid for one session of the subscriber only. If the subscriber controls simultaneous sessions, thresholds per session has to defined.

The type of threshold is indicated per session either as:

- a number of packets or
- a data volume transferred by the subscriber or
- a granted time to transfer packets.

A threshold is reached within a session, when:

- the number of packets reach the maximum number of granted packets,
- the total amount of transmitted data reach the granted data volume,
- when the time since allowed for data transmission is elapsed.

If the CSE has activated this service event for a session and a threshold is reached, the VPLMN shall suspend processing, buffer further packets, 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 session 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 other control service events for the session. The CSE shall have the possibility to send the following information:
 - The service event which shall be detected and reported (including a session reference number):
 - Data Packet Threshold Procedure (including the type of threshold and when the threshold shall be reached)
 - PDP deactivation
 - Detach procedure

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 session;
- perform charging activities;
- allow the processing to continue unchanged;

10.8 PDP deactivation / Session Release

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 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 session 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 other control service events for the session. The CSE shall have the possibility to send the following information:
 - Detach Procedure
- perform charging activities;
- allow the processing to continue unchanged;

10.9 Detach procedure

The purpose of this procedure is to detect a request from a GPRS subscriber to detach from the data network and to inform the CAMEL Service Environment on the request.

If the detach request occurs, then the VPLMN shall send a notification and continue.

The following information shall be provided to the CAMEL Service Environment, if available:

- Event met;

10.10 CSE Initiated GPRS Detach Procedure

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

To use this procedure the CSE shall previously have activated any service event (with "type of monitoring" set to control).

10.11 CSE Initiated PDP Context Deactivation Procedure

Following the CAMEL processing of the PDP context activation procedure it shall be possible for the CSE to initiate PDP context deactivation at any time.

To use this procedure the CSE shall previously have activated any service event (with "type of monitoring" set to control).

11 Procedures for USSD \$(CAMEL3\$)

The purpose of this procedure is to give the CSE visibility of USSD messages sent or received by the subscriber, and to give the CSE the opportunity of blocking the sending or reception of USSD messages by the subscriber.

The CSE shall be able to indicate to the network how it wants to be informed about the sending / reception of USSD messages:

- [- inform CSE about sending of USSD MMI mode messages]
- inform CSE about sending of USSD application mode messages
- [- inform CSE about reception of USSD MMI mode messages]
- inform CSE about reception of USSD application mode messages

In all the above cases, the CSE shall be able to specify whether it requires to be notified on each USSD message or on every 'n' messages (e.g. notify CSE every 20 sent USSD bearer mode messages).

At any time, the CSE shall be able to set the required handling of USSD messages by the network:

- [- allow / prevent USSD MMI mode messages]
- allow / prevent USSD application mode messages.

[Editors Node: The need for MMI mode has to be checked. Text [] will be removed if not justified]

12 Notifications of non-traffic events to the CSE \$(CAMEL3\$)

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 of MS. Following criteria shall be able to defined:
 - Location update in a different VLR service area;
 - Location update in 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;
- IMSI;
- Basic MSISDN;
- Location information;
- LSA identity;
- CAMEL phase 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 GSM 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 or 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 GSM supplementary services are invoked:

- ECT
- CD
- MPTY

13 CSE control of GSM subscription data \$(CAMEL3\$)

13.1 Any time interrogation \$(CAMEL2\$)

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;
- Call forwarding SS data \$(CAMEL3\$);
- Call barring SS data \$(CAMEL3\$);
- Operator determined barring data \$(CAMEL3\$);
- CAMEL subscription information \$(CAMEL3\$);
- CAMEL phase supported at the VPLMN \$(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).

This shall be data from the list below:

- Call forwarding supplementary service data;
- Call barring supplementary service data;
- CAMEL subscription information.

The HPLMN shall have the possibility to reject any 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 towards the calling subscriber.

\$(begin\$(CAMEL3\$)

It shall be possible for the CSE to order the playing of announcements and tones towards a call party, or a group of call parties who are connected together, at any time in the active phase of a call.

[Editors Note: The possibility will be checked by SMG3 WPC]

\$(end\$(CAMEL3\$)

The HPLMN operator is responsible for the administration of announcements. In case of bilateral agreements also the VPLMN operator may administrate announcements.

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

\$(begin\$(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 forwarding.

\$(end\$(CAMEL2\$)

\$(begin\$(CAMEL3\$)

It shall be possible for the CSE to order voice prompting and information collection towards a call party in any phase of the call as long as the call party is active and the call is under control of the CSE. Furthermore, this shall be possible both whilst the call is suspended (and awaiting instructions from the CSE) and whilst the call is proceeding. Note that the collection of information is only possible when the call party is not connected to another call party. This may be during call setup, or as a result of a call party being put on hold. It shall not be possible to collect information from the user as part of the originating CAMEL handling for a forwarding.

\$(end\$(CAMEL3\$)

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

It shall be possible for the CSE to initiate a USSD towards the served subscriber at any time. It shall be possible for the CSE to receive a served subscriber initiated USSD at any time (see GSM 02.30 [3] and GSM 02.90 [4]).

14.4 User interaction scripts \$(CAMEL3\$)

It shall be possible for the CSE to instruct a SRF to execute a logic script which defines the process of a user interaction. The SRF shall be in either the HPLMN or the VPLMN. The SRF shall notify the CSE of the result of executing the logic script.

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 to control 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 applies 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 form of a relative time to the reception of the instruction.

15.1 CSE controlled e-values

If the subscriber is provisioned with a CAMEL based service and if a contact exists between the IPLMN/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, several sets of e-values may be sent by the CSE to the IPLMN/VPLMN and transmitted in sequence to the Mobile Station.

Before the call is answered, the CSE may send either one set or two set 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 when the second set becomes valid must also be sent;
 - the first set of e-values is applicable from the beginning of the call except in the case where the tariff switch time occurs before the call is answered, then the second set of e-values is applicable at 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 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 is sent immediately to the mobile station, if available.

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.

The maximum length of the information to be sent by the CSE and to be stored in the final call record is 40 bytes.

[Editors Note: A liaison statement is sent to CAGE2+]

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 time from the CSE;
- b) receive a switch time until 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 on how to proceed when the maximum call period duration time is expired, i.e. release the call or report to the CSE. The CSE shall also be able to instruct the IPLMN/VPLMN of a tone to be played before the maximum call period duration time is expired, and of the time when the tone shall be played.

\$(begin\$(CAMEL3\$)

The CSE shall be able to instruct the IPLMN/VPLMN to begin playing the tone at anytime before the maximum call period time is expired:

The tone to be played shall consist of up to three audible bursts. A burst shall consist of a single tone, or a sequence of two tones, or a sequence of three tones. A normal speech path connecting all parties in the call shall be established between bursts. Only designated call parties shall hear a burst. The CSE shall be able to instruct the IPLMN/VPLMN:

- The time before the maximum call period time expires when tone playing shall start.
- The number of bursts to be played (1, 2 or 3).
- The time interval between bursts (maximum 120 seconds).
- The number of tones in each burst (1, 2 or 3).
- The duration of tones in a burst.
- The pause between tones in a burst.
- The tone, from a selection of at least three available tones.
- The parties in the call that shall hear a burst.

\$(end\$(CAMEL3\$)

When the instruction sent by the CSE is received at the IPLMN/VPLMN 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 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 when the second set becomes valid must be also sent;
 - the first set of e-values is applicable from the beginning of the call except in the case where the tariff switch time occurs before the call is answered, then the second set of e-values is applicable at the beginning of the call.

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

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:
 - report the elapsed time since the call is answered to the CSE,
- if a tariff switch has occurred since the call is answered:
 - report the elapsed time since the last tariff switch has applied,
 - report 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 other control service events for the call. The CSE shall have the possibility to send the following information:

- The 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;
- allow the call processing to continue unchanged;

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 for 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 is sent immediately to the mobile station, if available.

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

- if no tariff switch has occurred since the call is answered:
 - report the elapsed time since the call is answered to the CSE.
- if a tariff switch has occurred since the call is answered:
 - report the elapsed time since the last tariff switch has applied,
 - report 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.

In addition, the report to the CSE shall always contain:

- the state whether the call is ongoing or released.

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

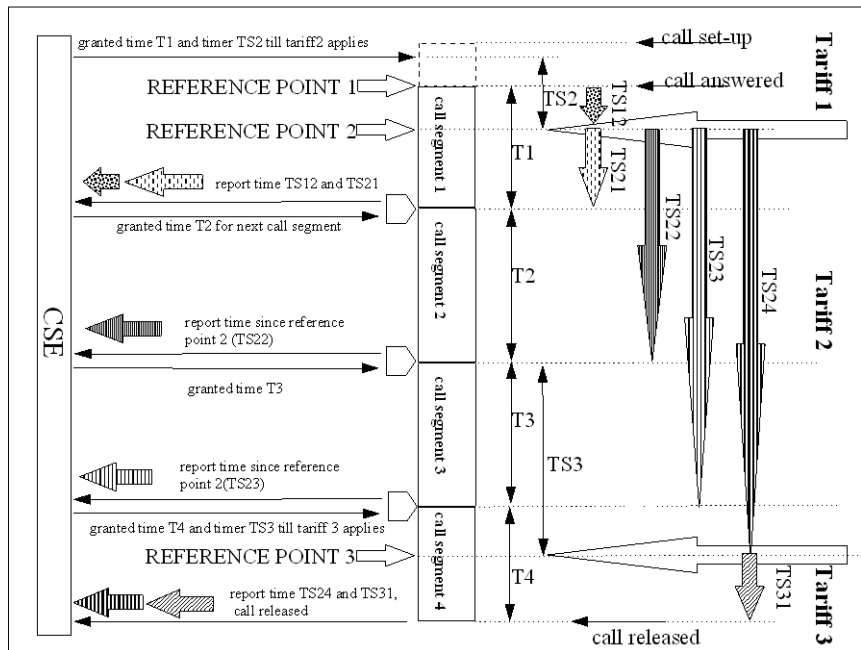


Figure 1: CSE control of call duration

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 T_x (x is the number of the call period).

Timers indicating the duration until the next tariff applies are called TS_x (x is the number of the tariff).

Timers indicating the elapsed time in a certain tariff are called TS_{xy} (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 towards 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

[Editors Note: Text to be checked. Section is on hold. Needs discussion and advice on MoU]

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 shall have the possibility to decide on a per subscriber basis whether to allow or to deny MO calls and/or MT calls (e.g. applying ODB, denying location up-date).

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

If the HPLMN allows MT calls, the terminating OSSs are not always (fully) supported for the roaming subscriber.

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

In case 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).

16.3 Roaming in a VPLMN which supports only CAMEL phase 1 \$(CAMEL2\$)

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 1 the HPLMN shall take such action (including denying the registration request or transferring to the VPLMN subscription information appropriate to CAMEL phase 1) as may be decided by the HPLMN operator.

16.4 Call setup from a VPLMN which supports only CAMEL phase 1 \$(CAMEL2\$)

If the served subscriber requests an MO call which requires the VPLMN to contact the CSE, the VPLMN shall indicate to the CSE which phase of CAMEL the VPLMN supports. If the VPLMN supports only CAMEL phase 1 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 phase 1 capabilities) as may be decided by the CSE operator.

16.5 Call setup from an IPLMN which supports only CAMEL phase 1 \$(CAMEL2\$)

When the IPLMN contacts the CSE for instructions to handle an MT call, the IPLMN shall indicate to the CSE which phase of CAMEL it supports. If the IPLMN supports only CAMEL phase 1 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 phase 1 capabilities) as may be decided by the CSE operator.

17 CSE related congestion control

It shall be possible for the CSE to request that either all or some CAMEL interrogations be dropped by the VPLMN and/or IPLMN. It shall be possible to specify that these interrogations be dropped if:

- the Global Title of the CSE that the congestion control request was received from matches the Global Title of the CSE that is indicated in the O-CSI or T-CSI, or
- the Global Title of the CSE that the congestion control request was received from matches the Global Title of the CSE that is indicated in the O-CSI or T-CSI and the service key indicated in the congestion control request from the CSE matches the service key indicated in the O-CSI or T-CSI.

18 Interactions with supplementary services

18.1 General

This subclause defines the interaction between GSM 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 GSM services having an adverse interaction with the CAMEL based services. GSM supplementary services shall not 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 are the call forwarding services, described in subclause 12.3.1.

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)

No interaction. The CSE is not able to change the presentation indicator given to the called subscriber via the CLIP supplementary service.

18.2.3 Connected Line Identification Presentation (COLP)

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

18.2.4 Connected Line Identification Restriction (COLR)

No interaction. The CSE is not able to change the presentation indicator given to the calling subscriber via the COLP supplementary service.

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 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 translations of 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 detection points for 'Busy', 'Not Reachable' or 'No Answer' are armed when the corresponding 'conditional' GSM 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. Any forwarded call resulting from a GSM Call Forwarding supplementary service may cause invocation of any mobile originated CAMEL based services.

\$(begin\$(CAMEL3\$)

The CSE shall be able to instruct the forwarding PLMN to suppress the normal handling of Call Forwarding Unconditional and replace it by one or other of the following:

- If Call Forwarding Unconditional is active and operative for the call being processed, the call shall fail, with a reason of Forwarding Violation;
- The call shall be handled as if Call Forwarding Unconditional was not active and operative.

\$(end\$(CAMEL3\$)

18.3.2 Call Forwarding on Busy (CFB)

As for Call Forwarding Unconditional (see subclause 12.3.1).

\$(begin\$(CAMEL3\$)

The CSE shall be able to instruct the forwarding PLMN to suppress the normal handling of Call Forwarding on Busy and to handle the call as if Call Forwarding on Busy was not active and operative.

\$(end\$(CAMEL3\$)

18.3.3 Call Forwarding on No Reply (CFNRy)

As for Call Forwarding on Busy (see subclause 12.3.1).

18.3.4 Call Forwarding on Not Reachable (CFNRc)

As for Call Forwarding on Busy (see subclause 12.3.1).

18.4 Call Completion

18.4.1 Call Hold (CH)

No interaction. For 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.

18.4.2 Call Waiting (CW)

No interaction. Incoming, waiting calls are treated by the CSE as any other mobile terminating calls which encounter an idle subscriber.

18.5 Multi Party (MPTY)

No interaction. A multi party call may include one or more calls subject to CAMEL based services.

18.6 Closed User Group (CUG)

The Closed User Group supplementary service shall be invoked before any originating or terminating CAMEL based service.

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

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

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.

\$(begin\$(CAMEL2\$)

If CAMEL phase 2 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 only be sent by the VPLMN to the MS if the served subscriber is provided with the AoC supplementary service according to GSM 02.86.

\$(end\$(CAMEL2\$)

18.8 Call Barring

\$(begin\$(CAMEL2\$)

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

\$(end\$(CAMEL2\$)

18.8.1 Barring of all outgoing calls

18.8.1.A 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.B 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 GSM 02.82.

[Editor's note: this may be GSM 02.88 - needs checking]

18.8.2 Barring of outgoing international calls

18.8.2.1 Mobile originated calls

No interaction. Any originating CAMEL based services shall be invoked before the Barring of outgoing international calls supplementary service.

\$(begin\$(CAMEL3\$)

The CSE shall be able to instruct the originating VPLMN to suppress the invocation of Barring of outgoing international calls and to handle the call as if Barring of outgoing international calls was not active and operative.

\$(end\$(CAMEL3\$)

18.8.2.2 Forwarded Calls

No interaction. The interaction between call forwarding and call barring is not be 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 a TIF-CSI the network shall not perform the interaction of call forwarding services with this barring program, i.e.

- the registration request 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\$)

\$(begin\$(CAMEL1\$)

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

\$(end\$(CAMEL1\$)

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

As for Barring of outgoing international calls (see subclause 12.8.2).

18.8.4 Barring of all incoming calls

[Editors Note: text to be drafted]

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 12.8.4).

18.9 Explicit Call Transfer (ECT)

No interaction. A ECT call may include one or both calls subject to CAMEL based services.

18.10 Completion of Call to Busy Subscriber (CCBS)

See GSM 02.93 [1].

18.11 Multiple Subscriber Profile (MSP)

See GSM 02.97 [5].

19 Interactions with Operator Determined Barring (ODB)

19.1 Barring of all outgoing calls

Same principle as for subclause 12.8.1.

19.2 Barring of all outgoing international calls

Same principle as for subclause 12.8.2.

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

Same principle as for subclause 12.8.3.

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 premium rate calls

Same principle as for subclause 13.3. The handling will be the same both for Premium rate information and Premium rate entertainment.

19.6 Barring of incoming calls

Same principle as for subclause 12.8.4.

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

Same principle as for subclause 12.8.4.

19.8 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 only applicable when registered in HPLMN.

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

19.9 Barring of Supplementary Services Management

No interaction.

20 Interactions with Optimal Routeing (OR)

Invocation of OR shall not have any impact of any CAMEL based service.

If OR is applied to a late Call Forward 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\$)

When VPLMN-A contacts the CSE of the originating subscriber, it shall indicate whether it supports OR. If the CSE of the originating subscriber indicates that the call may be subject to basic OR, VPLMN-A shall act as an IPLMN and interrogate HPLMN-B as specified for SOR.

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.

[Editors Note: Interaction with OR LCF R'96 has to be studied and text might be changed.]

\$(end\$(CAMEL3\$)

Specific interaction is described in GSM 02.79 [2].

21 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 that is transferred towards the CSE on various events. The numbers are reflecting the applicable Camel phase (1, 2, 3).

	Call set-up request procedure 1	Call set-up request procedure 2	Call set-up request procedure 3	Call set-up request procedure 4	Unsuccessful call establishment	Incoming call request procedure	Procedures for serving network dialled services	Procedures for serving network dialled services
Event met	1	1	3	3	3	1	3	3
IMSI	1	1	3	3	3	1	3	3
Calling Party's Number	1	1	3	3	3	1	3	3
Calling Party's Category	1	1	3	3	-	1	3	3
Additional Calling Party Number	-	1	-	3	-	1	-	3
Called Party BCD Number	1	-	3	-	3	-	3	-
Called Party Number	-	1	-	3	-	1	-	3
Original Called Party Number	-	1	-	3	-	1	-	3
Redirecting (Party) Number ????	-	1	-	3	-	1	-	3
Redirection Information	-	1	-	3	-	1	-	3
Service Key	1	1	3	3	3	1	3	3
ISDN Bearer Capability	1	1	3	3	3	1	3	3
High Layer Compatibility	1	1	3	3	3	1	3	3
Basic Service Code	1	1	3	3	3	1	3	3
Call Identification Information	1	1	3	3	3	-	?	?
Location Information of the Calling Subscriber	1	-	3	-	3	-	3	-
Location Number of the Calling Subscriber	-	-	-	-	-	1	-	-
Location information of the called subscriber	-	-	-	-	-	1	-	-
Subscriber State of the called subscriber	-	-	-	-	-	1	-	-
Time and Time Zone Information - \$(CAMEL2\$)	2	2	3	3	3	2	?	?
Optimal Routing Indication - \$(CAMEL3\$)	-	-	?	?	-	-	3	3
Calling Party LSA (if available) \$(CAMEL3\$)	3	-	3	-	-	-	3	-
IMEI -\$(CAMEL3\$)	3	-	3	-	3	-	?	-
Terminal characteristics and capabilities (see MExE, 02.57) - \$(CAMEL3\$)	3	-	3	-	3	-	?	-
MExE classmark (see MExE, 02.57) -\$(CAMEL3\$)	3	-	3	-	3	-	?	-
NAEA Carrier Identification Code (CIC) -\$(CAMEL3\$)	3	3	3	3	3	3	3	3
NAEA Carrier Selection Information (pre-subscribed or on-demand) -\$(CAMEL3\$)	3	3	3	3	3	3	3	3
NAEA Originating Line Identification (OLI) - \$(CAMEL3\$)	-	3	-	3	-	-	-	3
NAEA Charge Number (CN) - \$(CAMEL3\$)	-	3	-	3	-	-	-	3

Table A-1: Information transferred towards the CSE

A.2 Information sent by the CSE

The following table shows the information that is sent by the CSE on various events. The numbers are reflecting the applicable Camel phase (1, 2, 3).

	Call set-up request procedure 1	Call set-up request procedure 2	Unsuccessful call establishment (MO)	Call disconnection procedure (MO)	Creation of called parties	Incoming call request procedure	Unsuccessful call establishment (MT)	Call disconnection procedure (MT)	Procedures for serving network dialled services	CSE initiated call set up
Called Party Number	1	3	2	2	3	1	2	2	3	3
Calling Party Number	-	-	-	-	3	-	2	-	-	3
Calling Party's Category	1	3	2	2	3	1	2	2	3	3
Calling IMSI	-	-	-	-	-	-	-	-	-	3
ISUP CUG information	-	-	-	-	3	-	-	-	-	-
Additional Calling Party's Number	1	3	2	2	3	1	2	2	3	3
Original Called Party Number	1	3	2	2	-	1	2	2	3	-
Redirection Party Number	1	3	2	2	3	1	2	2	3	-
Redirection Information	1	3	2	2	3	1	2	2	3	-
Alerting Pattern	-	-	-	-	3	2	-	-	-	3
ISDN Access related Information	-	-	-	-	3	-	-	-	-	3
ISDN Bearer Capability	-	-	-	-	3	-	-	-	-	3
High Layer Compatibility	-	-	-	-	-	-	-	-	-	-
Basic Service Code	-	-	-	-	-	-	-	-	-	-
Called Party to be Created	-	-	-	-	3	-	-	-	-	3
New Call Segment	-	-	-	-	3	-	-	-	-	3
In Service Compatibility Response	-	-	-	-	3	-	-	-	-	3
Service Interaction Indicators Two	-	-	-	-	3	-	-	-	-	3
Location Number	-	-	-	-	3	-	-	-	-	3
Optimal Routing Indication \$(CAMEL3\$)	3	3	3	2	3	3	3	3	-	3
NAEA Carrier Identification Code (CIC) - \$(CAMEL3\$)	-	3	3	3	3	3	3	3	-	3
NAEA Carrier Selection Information (pre-subscribed or on-demand) - \$(CAMEL3\$)	-	3	3	3	3	3	3	3	-	3
NAEA Originating Line Identification (OLI) - \$(CAMEL3\$)	-	3	3	3	3	3	3	3	-	3
NAEA Charge Number (CN) - \$(CAMEL3\$)	-	-	-	-	-	3	3	3	-	-
CSE Address	-	-	-	-	-	-	-	-	-	3

Table A-2: Information sent by the CSE

A.3 GPRS Information provided to the CSE

The following table shows the information that is transferred towards the CSE on various GPRS events. The numbers are reflecting the applicable Camel phase (3).

	Attach procedure	PDP activation / Session Establishment	PDP activation / Session Establishment
Event met	3	3	3
Type of monitoring	-	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
Time stamp information	3	3	3
Time zone information	3	3	3
GPRS MS Class	3	3	3
PDP transport protocol, i.e. IP or X.25	-	3	3
Quality of Service information (subscribed, requested,	-	3	3
Destination address information	-	3	3
GPRS charging correlation ID	-	-	3
Destination address information	-	-	3

Table A-3: GPRS Information transferred towards the CSE

Annex B (informative): Change history

Change history					
SMG No.	TDoc. No.	CR. No.	Section affected	New version	Subject/Comments
SMG#19	365/96	None		2.0.0	Submitted for approval (Approved)
SMG#20		A001 A002r1 A003 A004r1 A005 A006 A007 A008 A009	5.1, 5.2, 5.3, 6.1, 6.2, 6.3 2,3,4.1,5.2,6.1, 6.2,9.2,12 10.2.2 5.3,6.3,5.4,6.4 10.1, 10.3.1, 10.8.2 3, 7 5.1, 5.3, 6.1 6.3 5.1,6.1 4.2	5.1.0	Information exchanged between the CSE and the IPLMN/VPLMN Editorial enhancements and clarifications Interaction between CLIR and CAMEL CSE initiated call release procedure Interaction of CAMEL and Call Forwarding Subscriber Status Editorial change for inclusion of CAMEL charging information Ambiguity of the current stage 1 Information provided about the served subscriber
SMG#21	168/97	A010	10.2.1	5.1.1	Clarification of CAMEL interaction with CLIP
SMG#22	313/97	A011	3, Location Information	5.2.0	Introduce Age of Location Information MSC/VLR allowed to actualize location information whenever appropriate.
SMG#22	303/97	A012	Sections 2 and 5.1	5.2.0	Add reference to GSM 02.30 on MMI Add Control sequences (* and #) at Call Set-up
SMG#23	652/97	A013r4	Over all	5.3.0	Update to Include Phase 2 Release 97
SMG#24	977/97	A014	Overall	5.4.0	The specification is affected in various areas. Some changes are purely editorial and apply to both, CAMEL R96 and R97, and result from re-organisation of the previous text or editorial improvements. No technical changes to the CAMEL phase 1 are introduced
SMG#25	70/98	A015	Page 16, chapter 6.2:	5.5.0	Do make a efficient use of the new Detection Points, such as a not reachable called subscriber, it should be possible to suppress announcements even when the called party number has been changed by the CSE. This could happen in the case of One Number services.
SMG#25	70/98	A016	Chapter 6.2	5.5.0	As a part of "network's indication of alerting in the MS" work item, the stage 2 and stage 3 of CAMEL Phase 2 allow the CSE to send an alerting pattern to the IPLMN during the incoming call request procedure. The IPLMN can then forward this information to the VPLMN.
SMG#25	70/98	A017	Page 10, chapter 5.1	5.5.0	Similar treatment of CSE and GSM forwarding calls.
SMG#25	70/98	A018	5.4, 5.6 , 6.4, 6.6	5.5.0	Removal of the restriction on the number of Follow-on calls and/or call re-attempts that are allowed, in order to align with the stage 2 and stage 3 of CAMEL phase 2.
SMG#25	70/98	A019	Section 9	5.5.0	Editorial change of "call segment" to "call period" due to different meaning in ITU-T standards.
SMG#25				6.0.0	Conversion to version 6.0.0 Draft TS
Post SMG#25				6.0.1	Correction of SMG#25 Tdoc # to 070 from 105(incorrect)
SMG#26	98-0323	A020	1 and 6.2	6.1.0	Correction of misinterpretation of CR A16 of SMG#25.
SMG#26	98-0323	A021	12.8	6.1.0	Health warning of CAMEL interworking with Call Barring.
SMG#26	98-0323	A022	12.3	6.1.0	Correction and enhancement of CAMEL interworking with Call Forwarding. Following LS c394 from SMG3, PT SMG SMG1 secretary has added, following Camel "Phase 2" .
SMG#29	P-99-377	NEW		8.0.0	APPROVED AT SMG#29 in Miami

History

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