Technical Specification Group Services and System Aspects      ***TSGS#8(00)0198***
Meeting #8, Düsseldorf, Germany, 26-28 June 2000

**Source:**        **TSG SA1**

**Title:**         **CRs to CAMEL (22.078)**

**Document for:**  **Approval**

**Agenda Item:**   **6.1.3**

| Doc-1st-Level | Doc-2nd-Level | Spec | CR | Rev | Phase | Cat | Subject | Version-Current | Version-New |
|---|---|---|---|---|---|---|---|---|---|
| SP-000198 | S1-000232 | 22.078 | 037 | | R99 | F | Correction to the reduced scope of CAMEL Phase 3 in release 99 – enhancements to call forwarding | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000247 | 22.078 | 038 | | R99 | F | Correction to the reduced scope of CAMEL Phase 3 in release 99 – deletion of MexE / SAT free format data parameter in Annex A.1 | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000251 | 22.078 | 039 | | R99 | F | Correction to description of subscriber dialled services | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000252 | 22.078 | 040 | | R99 | F | Clarification for conditional triggering for subscribed dialled services | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000255 | 22.078 | 041 | | R99 | C | Removal of NPI from conditional triggering | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000395 | 22.078 | 042 | | R99 | D | Corrections to Interactions with Supplementary Services | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000396 | 22.078 | 043 | | R99 | D | Removal of question marks from the A.1 information flow table | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000402 | 22.078 | 044 | | R99 | D | Definition of Geodetic Information | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000403 | 22.078 | 045 | | R99 | D | Distinction between initial and subsequent service events | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000404 | 22.078 | 046 | | R99 | D | Update of CAMEL roaming issues (section 16) | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000390 | 22.078 | 047 | | R99 | D | Removal of Editor's notes and corrections to Annex 1 | 3.3.0 | 3.4.0 |
| SP-000198 | S1-000445 | 22.078 | 048 | 2 | R99 | D | CR to 22.078 R99 on Corrections to CAMEL interworking with GPRS re3 | 3.3.0 | 3.4.0 |

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| | | | | |
|---|---|---|---|---|
| **22.078** | **CR** | **037** | Current Version: | 3.3.0 |

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑*          *↑ CR number as allocated by MCC support team*

| For submission to: | | for approval | **X** | strategic | | *(for SMG* |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | | *use only)* |

*Form: CR cover sheet, version 2 for 3GPP and SMG*      *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:**     (U)SIM [ ]     ME [ ]     UTRAN / Radio [ ]     Core Network **X**
*(at least one should be marked with an X)*

| **Source:** | Lucent Technologies | **Date:** | 04/02/2000 |
|---|---|---|---|

| **Subject:** | Correction to the reduced scope of CAMEL Phase 3 in release 99 – enhancements to call forwarding |
|---|---|

| **Work item:** | CAMEL Phase 3 |
|---|---|

| **Category:** | F | Correction | **X** | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|
| | A | Corresponds to a correction in an earlier release | | | Release 96 | |
| *(only one category* | B | Addition of feature | | | Release 97 | |
| *shall be marked* | C | Functional modification of feature | | | Release 98 | |
| *with an X)* | D | Editorial modification | | | Release 99 | **X** |
| | | | | | Release 00 | |

| **Reason for change:** | CR 33 against 22.078 that re-aligned the scope of CAMEL Phase 3 omitted to modify the enhancements to call forwarding that were also postponed to CAMEL Phase 4 |
|---|---|

| **Clauses affected:** | 18.3.1, 18.3.2 |
|---|---|

| **Other specs affected:** | Other 3G core specifications | [ ] | → List of CRs: | |
|---|---|---|---|---|
| | Other GSM core specifications | [ ] | → List of CRs: | |
| | MS test specifications | [ ] | → List of CRs: | |
| | BSS test specifications | [ ] | → List of CRs: | |
| | O&M specifications | [ ] | → List of CRs: | |

| **Other comments:** | |
|---|---|

help.doc

<--------- double-click here for help and instructions on how to create a CR.

## 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 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 18.3.1).

$(begin$(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. If no terminating CAMEL service is active then a new relationship is opened to the CSE prior to CF invocation. In order to open new relationship the failure reason criterion shall be checked. In order to check triggering criteria the forwarding PLMN shall derive reason code from call forwarding reason; this derived reason code is compared to the triggering criteria.

$(end$(CAMEL3$)

**3GPP SA1**

**Sophia Antipolis, France, 5-6 April 2000**

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| | | | | | Current Version: | 3.3.0 |
|---|---|---|---|---|---|---|
| **22.078** | **CR** | **038** | | | | |

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑*            *↑ CR number as allocated by MCC support team*

| For submission to: | | for approval | **X** | strategic | | *(for SMG* |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | | *use only)* |

*Form: CR cover sheet, version 2 for 3GPP and SMG          The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

| **Proposed change affects:** | (U)SIM | | ME | | UTRAN / Radio | | Core Network | **X** |
|---|---|---|---|---|---|---|---|---|
| *(at least one should be marked with an X)* | | | | | | | | |

| **Source:** | Lucent Technologies | **Date:** | 04/02/2000 |
|---|---|---|---|

| **Subject:** | Correction to the reduced scope of CAMEL Phase 3 in release 99 – deletion of MexE / SAT free format data parameter in Annex A.1 |
|---|---|

| **Work item:** | CAMEL Phase 3 |
|---|---|

| **Category:** | F | Correction | **X** | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|
| | A | Corresponds to a correction in an earlier release | | | Release 96 | |
| *(only one category* | B | Addition of feature | | | Release 97 | |
| *shall be marked* | C | Functional modification of feature | | | Release 98 | |
| *with an X)* | D | Editorial modification | | | Release 99 | **X** |
| | | | | | Release 00 | |

| **Reason for change:** | CR 33 against 22.078 that re-aligned the scope of CAMEL Phase 3, a parameter relating to MexE/SAT free format data still appears. This should have been deleted in the original CR. |
|---|---|

| **Clauses affected:** | 18.3.1, 18.3.2 |
|---|---|

| **Other specs affected:** | Other 3G core specifications | | → List of CRs: | |
|---|---|---|---|---|
| | Other GSM core specifications | | → List of CRs: | |
| | MS test specifications | | → List of CRs: | |
| | BSS test specifications | | → List of CRs: | |
| | O&M specifications | | → List of CRs: | |

| **Other comments:** | |
|---|---|

help.doc

<---------- double-click here for help and instructions on how to create a CR.

# 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 (!, 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 | Unsuccessful call establishment (MT) | Incoming call request procedure | Procedures for serving network dialled services 1 | Procedures for serving network dialled services 2 |
|---|---|---|---|---|---|---|---|---|---|
| Event met | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | |
| IMSI | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | |
| Calling Party's Number | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | |
| Calling Party's Category | 1 | 1 | 3 | 3 | - | 3 | 1 | 3 | |
| Additional Calling Party Number | - | 1 | - | 3 | - | 3 | 1 | - | |
| Called Party BCD Number | 1 | - | 3 | - | 3 | - | - | 3 | |
| Called Party Number | - | 1 | - | 3 | - | 3 | 1 | - | |
| Original Called Party Number | - | 1 | - | 3*1 | - | 3 | 1 | - | 3 |
| Redirecting (Party) Number ???? | - | 1 | - | 3 | - | 3 | 1 | - | |
| Redirection Information | - | 1 | - | 3 | - | 3 | 1 | - | |
| Service Key | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | |
| ISDN Bearer Capability | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | |
| High Layer Compatibility | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | |
| Basic Service Code | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 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 | - | - | - | - | - | 3 | 1 | - | |
| Location information of the called subscriber | - | - | - | - | - | 3 | 1 | - | |
| Subscriber State of the called subscriber | - | - | - | - | - | 3 | 1 | - | |
| Cause - $(CAMEL3$) | - | - | - | - | 3 | 3 | - | - | |
| Time and Time Zone Information - $(CAMEL2$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | ? | |
| | | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Calling Party LSA (if available) $(CAMEL3$) | 3 | - | 3 | - | - | - | - | 3 |
| ~~MExE / SAT Free formatted information   $(CAMEL3$)~~ | ~~3~~ | - | ~~3~~ | - | ~~3~~ | ~~3~~ | - | ~~3~~ |
| NAEA Carrier Identification Code (CIC) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 |
| NAEA Carrier Selection Information (pre-subscribed or on-demand) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | - | 2 | 3 |
| CUG Index if received from the calling subscriber | 3 | - | - | - | - | - | - | - |
| CUG Interlock Code | - | 3 | - | - | - | - | 3 | - |
| CUG Outgoing Access Indicator | - | 3 | - | - | - | - | 3 | - |

**Table A-1: Information transferred towards the CSE**

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

 [CR editor's note: S1 tdoc S1-99674 has no column for MT unsuccessful case. However, it indicates that some elements are supported in CAMEL ph 2 for unsuccessful cases. This fact needs clarification in future meetings.]

# CHANGE REQUEST

| **22.078** | **CR** | **039** | | Current Version: | 3.3.0 |
|---|---|---|---|---|---|

| For submission to: | | for approval | **X** | strategic | |
|---|---|---|---|---|---|
| | | for information | | non-strategic | |

**Proposed change affects:**    (U)SIM ☐    ME ☐    UTRAN / Radio ☐    Core Network **X**

| **Source:** | Ericsson | | **Date:** | 05/04/2000 |
|---|---|---|---|---|

| **Subject:** | Correction to description of subscribed dialled services |
|---|---|

| **Work item:** | CAMEL Phase 3 |
|---|---|

| **Category:** | F | Correction | **X** | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|
| | A | Corresponds to a correction in an earlier release | | | Release 96 | |
| | B | Addition of feature | | | Release 97 | |
| | C | Functional modification of feature | | | Release 98 | |
| | D | Editorial modification | | | Release 99 | **X** |
| | | | | | Release 00 | |

| **Reason for change:** | Section 5.3.2.2 needs correction to correctly reflect the CSE capabilities for subscribed dialled services. The current wording may lead to confusion and/or misinterpretation. |
|---|---|

| **Clauses affected:** | 5.3.2.2 |
|---|---|

| **Other specs affected:** | Other 3G core specifications | ☐ | → List of CRs: | |
|---|---|---|---|---|
| | Other GSM core specifications | ☐ | → List of CRs: | |
| | MS test specifications | ☐ | → List of CRs: | |
| | BSS test specifications | ☐ | → List of CRs: | |
| | O&M specifications | ☐ | → List of CRs: | |

| **Other comments:** | |
|---|---|

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

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

### 5.3.2.1 Initiation of contact with the CSE

If (according to the CSI):

- the subscriber is provisioned with a CAMEL based originating service; and

- the call set-up request occurs; and

- the criteria are satisfied.

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

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

- ~~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);~~

- ~~release the call;~~

- perform charging activities ~~(the CSE is only allowed to include charging data in the Call Data Record);~~
  The CSE is only allowed to send e-parameters (refer to sect. 15.1, 'CSE controlled e-values') and include free format data in Call Data Records (refer to sect. 15.2, 'Inclusion in charging records of information received from the CSE');

- order in-band user interaction. (Interaction between the service triggered from previous triggering may be needed to avoid duplicated guidance etc.).

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

- 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);

-    release the call;

**3GPP SA1**

**Document** *S1-000252*

**Sophia Antipolis, France, 5-6 April 2000**

# CHANGE REQUEST

| | | | |
|---|---|---|---|
| **22.078** CR | **040** | Current Version: | 3.3.0 |

For submission to:

| | for approval | **X** | strategic | |
|---|---|---|---|---|
| | for information | | non-strategic | |

**Proposed change affects:**    (U)SIM ☐    ME ☐    UTRAN / Radio ☐    Core Network **X**

| | | | |
|---|---|---|---|
| **Source:** | Ericsson | **Date:** | 05/04/2000 |

| | |
|---|---|
| **Subject:** | Clarification for conditional triggering for subscribed dialled services |

| | |
|---|---|
| **Work item:** | CAMEL Phase 3 |

**Category:**

| | | | **Release:** | | |
|---|---|---|---|---|---|
| F | Correction | | Phase 2 | |
| A | Corresponds to a correction in an earlier release | | Release 96 | |
| B | Addition of feature | | Release 97 | |
| C | Functional modification of feature | | Release 98 | |
| D | Editorial modification | **X** | Release 99 | **X** |
| | | | Release 00 | |

| | |
|---|---|
| **Reason for change:** | The present CR proposes the inclusion of a clarifying text on conditional triggering for subscribed dialled services.<br><br>When conditional triggering for a subscribed dialled service is performed, the number that shall be used for the conditional triggering check may have been modified by a previous CAMEL service, which was invoked when digits were collected.<br><br>This behaviour needs to be properly documented in the stage 1 document. This CR proposes the clarifying text in sect. 5.2. |

| | |
|---|---|
| **Clauses affected:** | 5.2 |

**Other specs affected:**

| | | | |
|---|---|---|---|
| Other 3G core specifications | | → List of CRs: | |
| Other GSM core specifications | | → List of CRs: | |
| MS test specifications | | → List of CRs: | |
| BSS test specifications | | → List of CRs: | |
| O&M specifications | | → List of CRs: | |

| | |
|---|---|
| **Other comments:** | The same behaviour applies for Serving network dialled services. This behaviour is already described in the stage 1 document (chapter 7). |

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

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

The following criteria may be defined.

### 5.2.1 CSI criteria applicable at call setup

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

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

- Criteria on the dialled number; these consist of:

    - The contents of the dialled number (a list of up to 10 dialled number strings may be defined in the criteria. Each dialled number string may be of any type of number (TON) format. supported by the access protocol); There is no restriction on the Number Plan Indicator (NPI).

    - The length of the dialled number (a list of up to three lengths may be defined).

- The criteria on the dialled number may be collectively defined to be either "enabling" triggering criteria or "inhibiting" triggering criteria (see below). The HPLMN may also choose not to define any criteria on the dialled number.

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

- A criterion on the type of call: this consists of defining whether or not the call must be a forwarded call.

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

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

- the dialled number matches a dialled number string defined in the criteria; or

- the length of the dialled number matches a dialled number length defined in the criteria.

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

- the dialled number does not match any of the dialled number strings defined in the critera; and

- the length of the dialled number is not the same as any dialled number length defined in the criteria.

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

- the two numbers are of the same Type Of Number (TON); and

- the two numbers have the same Number Plan Indicator (NPI); and

- the dialled number is at least as long as the dialled number string in the criteria; and

- all the digits in the dialled number string in the criteria match the leading digits of the dialled number.

If no criterion on the dialled number is specified then the dialled number criteria are satisfied.
The criterion on the basic service is satisfied if the basic service used for the call corresponds to any basic service code or basic service group defined in the criterion or if no basic service criterion is specified.
The criterion on the type of call is satisfied if the type of the call is the same as the type defined in the criterion or if no call type criterion is specified.
The criteria on the call setup event procedure are satisfied if:

- the criteria on the dialled number are satisfied; and

- the criterion on the basic service is satisfied; and

- the criterion on the type of call is satisfied.

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

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

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

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

In this test the called number matches one of the called number strings if:
- the two numbers are of the same Type Of Number (TON); and

- the two numbers have the same Number Plan Indicator (NPI); 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.

# CHANGE REQUEST

| **22.078** | **CR** | **041** | Current Version: | 3.3.0 |
|---|---|---|---|---|

| For submission to: | | for approval | **X** | strategic | |
|---|---|---|---|---|---|
| | | for information | | non-strategic | |

**Proposed change affects:**       (U)SIM ☐       ME ☐       UTRAN / Radio ☐       Core Network **X**

| **Source:** | Ericsson | | **Date:** | 05/04/2000 |
|---|---|---|---|---|

| **Subject:** | Removal of NPI from conditional triggering |
|---|---|

| **Work item:** | CAMEL Phase 3 |
|---|---|

| **Category:** | F | Correction | | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|
| | A | Corresponds to a correction in an earlier release | | | Release 96 | |
| | B | Addition of feature | | | Release 97 | |
| | C | Functional modification of feature | **X** | | Release 98 | |
| | D | Editorial modification | | | Release 99 | **X** |
| | | | | | Release 00 | |

| **Reason for change:** | The present CR proposes to remove the requirement to check for a match in Number Plan Indicator (NPI) at conditional triggering check for CAMEL Services that are invoked when digits have been collected (O-CSI) and for subsribed dialled Services (D-CSI).

The rationale of this proposal is the following:


(1)  There is no Service Requirement for a match in NPI for conditional triggering.


(2)  The encoding of NPI in the conditional triggering data (O-CSI, D-CSI) differs from the encoding of NPI in Called Party BCD Number and the encoding of NPI in Called Party Number.
Hence, NPI encoding-mapping tables would have to be kept in the SSF.

NPI checking may be suppressed with a 'wild card' NPI in the conditional triggering data (NPI = 'Unknown'). However, the implementation in the SSF still has to implement the mapping tables.

The number contained in O-CSI/D-CSI may have to be checked against:

–   Called Party BCD Number (in the case of an MO call)
–   Called Party Number (in the case of subscribed dialled service; originally dialled number modified by CSE at DP Collected Info)
–   ISDN-AddressString (FTN received from VLR) |
|---|---|

As is indicated in the 'Other Comments' section of the present CR, these number representations have different encodings of NPI.

(3) For Called Paty BCD Number, 3G TS 24.008 specifies the encoding of NPI only for a limited range of Type of Number (ToN) values. For other ToN values, the NPI encoding is undefined in 3G TS 24.008.

Therefore, the present CR proposes to remove the requirement to check on Number Plan Indicator.

| | | | | |
|---|---|---|---|---|
| **Clauses affected:** | | | | |
| **Other specs affected:** | Other 3G core specifications | | → List of CRs: | |
| | Other GSM core specifications | | → List of CRs: | |
| | MS test specifications | | → List of CRs: | |
| | BSS test specifications | | → List of CRs: | |
| | O&M specifications | | → List of CRs: | |

| | |
|---|---|
| **Other comments:** | Underneath follow the different encodings for Number Plan Indicator. |

**1. Encoding of NPI for conditional triggering (O-CSI and D-CSI)**
   *(ISDN-AddressString, specified in 3G TS 29.002)*

        0000  unknown
        0001  ISDN/Telephony Numbering Plan (Rec CCITT E.164)
        0010  spare
        0011  data numbering plan (CCITT Rec X.121)
        0100  telex numbering plan (CCITT Rec F.69)
        0101  spare
        0110  land mobile numbering plan (CCITT Rec E.212)
        0111  spare
        1000  national numbering plan
        1001  private numbering plan
        1111  reserved for extension

        all other values are reserved.

**2. Encoding of NPI for Called Party BCD Number**
   *(specified in 3G TS 24.008)*

   Number plan (applies for Type of Number = 000,  001, 010 and 100)

        0 0 0 0  unknown
        0 0 0 1  ISDN/telephony numbering plan (Rec. E.164/E.163)
        0 0 1 1  data numbering plan (Recommendation X.121)
        0 1 0 0  telex numbering plan (Recommendation F.69)
        1 0 0 0  national numbering plan
        1 0 0 1  private numbering plan
        1 0 1 1  reserved for CTS (see GSM 04.56)
        1 1 1 1  reserved for extension

All other values are reserved.

**3. Encoding of NPI for Called Party Number**
   *(specified in ITU-T Q.763)*

        0 0 0    spare
        0 0 1    ISDN (Telephony) numbering plan (Recommendation E.164)
        0 1 0    spare
        0 1 1    Data numbering plan (Recommendation X.121) (national use)
        1 0 0    Telex numbering plan (Recommendation F.69) (national use)
        1 0 1    reserved for national use
        1 1 0    reserved for national use
        1 1 1    spare

## 5.2.1 CSI criteria applicable at call setup

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

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

- Criteria on the dialled number; these consist of:

    - The contents of the dialled number (a list of up to 10 dialled number strings may be defined in the criteria. Each dialled number string may be of any type of number (TON) format. supported by the access protocol). ; There is no restriction on the Number Plan Indicator (NPI).

    - The length of the dialled number (a list of up to three lengths may be defined).

- The criteria on the dialled number may be collectively defined to be either "enabling" triggering criteria or "inhibiting" triggering criteria (see below). The HPLMN may also choose not to define any criteria on the dialled number.

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

- A criterion on the type of call: this consists of defining whether or not the call must be a forwarded call.

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

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

- the dialled number matches a dialled number string defined in the criteria; or

- the length of the dialled number matches a dialled number length defined in the criteria.

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

- the dialled number does not match any of the dialled number strings defined in the critera; and

- the length of the dialled number is not the same as any dialled number length defined in the criteria.

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

- the two numbers are of the same Type Of Number (TON); and

- the two numbers have the same Number Plan Indicator (NPI); and

- the dialled number is at least as long as the dialled number string in the criteria; and

- all the digits in the dialled number string in the criteria match the leading digits of the dialled number.

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

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

The criterion on the type of call is satisfied if the type of the call is the same as the type defined in the criterion or if no call type criterion is specified.
The criteria on the call setup event procedure are satisfied if:

- the criteria on the dialled number are satisfied; and

- the criterion on the basic service is satisfied; and

- the criterion on the type of call is satisfied.

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

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

The called number criterion is satisfied if the called number matches a called number string defined in the criterion.
In this test the called number matches one of the called number strings if:

- the two numbers are of the same Type Of Number (TON); and

- the two numbers have the same Number Plan Indicator (NPI); 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.

# 3G CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| **22.078** | **CR** | **042** | Current Version: | 3.3.0 |
|---|---|---|---|---|

*3G specification number ↑*  　　　　　　　　*↑ CR number as allocated by 3G support team*

For submission to TSG　**SA #8**　　for approval　**X**　(only one box should
*List TSG meeting no. here ↑*　　for information　□　be marked with an X)

*Form: 3G CR cover sheet, version 1.0　　The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

**Proposed change affects:**　　USIM □　　ME □　　UTRAN □　　Core Network □
*(at least one should be marked with an X)*

**Source:**　CAMEL ad hoc　　　　　　　　　　**Date:**　09/05/2000

**Subject:**　Corrections to Interactions with Supplementary Services

**3G Work item:**　CAMEL Phase 3

| **Category:** | F | Correction | | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|
| | A | Corresponds to a correction in an earlier release | | | Release 96 | |
| *(one category* | B | Addition of feature | | | Release 97 | |
| *and one release* | C | Functional modification of feature | | | Release 98 | |
| *only shall be* | D | Editorial modification | **X** | | Release 99 | **X** |
| *marked with an X)* | | | | | UMTS | |

**Reason for change:**　Section 18 does not fully cover the interactions between CAMEL Phase 3 and Supplementary Services. There is no indication that some sections only apply to CAMEL Phase 3.

**Clauses affected:**　18.2.2, 18.2.4, 18.4.1, 18.4.2, 18.5, 18.6, 18.9, 18.10, 18.xx (new).

| **Other specs affected:** | Other 3G core specifications | | → List of CRs: | |
|---|---|---|---|---|
| | Other 2G core specifications | | → List of CRs: | |
| | MS test specifications | | → List of CRs: | |
| | BSS test specifications | | → List of CRs: | |
| | O&M specifications | | → List of CRs: | |

**Other comments:**

help.doc

<---------- Double-click here for help and instructions on how to create a CR.

---

**\*\*\*\*First Modified Section \*\*\*\***

---

## 18.2.2 Calling Line Identification Restriction (CLIR)

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

$(begin$(CAMEL3$)

For an MO/MF call, the CSE shall be able to send to the VPLMN/IPLMN an ~~indication~~ instruction that the presentation indicator of the calling party number shall be set to ~~Withheld in the calling party number parameter~~"presentation restricted".

$(end$(CAMEL3$)

---

**\*\*\*\*Next Modified Section \*\*\*\***

---

## 18.2.4 Connected Line Identification Restriction (COLR)

~~No interaction.~~

$(begin$(CAMEL3$)

For an MT call, ~~T~~the CSE ~~is shall be~~not able to send to the VPLMN~~/IPLMN~~ an indication that ~~change~~ the presentation indicator ~~given to the calling subscriber via the COLP supplementary service~~ of the connected number shall be set to "presentation restricted".

$(end$(CAMEL3$)

---

**\*\*\*\*Next Modified Section \*\*\*\***

---

## 18.4.1 Call Hold (CH)

For both originating and terminating calls, the Call Hold service is invoked after the CAMEL feature is invoked. ~~When a call is established the CSE shall instruct the VPLMN of the served subscriber whether Call Hold is possible.~~A call created when a call has been put on hold may be subject to the CAMEL feature in the same way as a normal mobile originating call.

$(begin$(CAMEL3$)

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

$(end$(CAMEL3$)

---

**\*\*\*\*Next Modified Section \*\*\*\***

---

## 18.4.2 Call Waiting (CW)

Incoming, waiting calls are treated by the CSE as any other mobile terminating calls which encounter an idle subscriber.

$(begin$(CAMEL3$)

~~-~~When a call is established the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit Call Waiting~~ is possible~~.

$(end$(CAMEL3$)

<div style="border:2px solid black; text-align:center">

**\*\*\*\*Next Modified Section \*\*\*\***

</div>

## 18.5    Multi Party (MPTY)

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

$(begin$(CAMEL3$)

If a call leg is subject to CAMEL based services the CSE shall be able to instruct the VPLMN of the served subscriber whether to prohibit the inclusion of that leg ~~may be included~~ in a multi party call.

$(end$(CAMEL3$)

<div style="border:2px solid black; text-align:center">

**\*\*\*\*Next Modified Section \*\*\*\***

</div>

## 18.6    Closed User Group (CUG)

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

- if the called subscriber subscribes to CUG then the IPLMN shall release the call towards the calling party ~~when the called subscriber subscribes to CUG~~;

- if the called subscriber does not subscribe to CUG then the IPLMN shall continue the call establishment towards the destination defined by the modified called party number ~~when the called subscriber does not subscribe to CUG~~.

$(begin$(CAMEL3$)

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

- continue the call establishment with the original CUG information, or

- use modified CUG information for that call, or

- remove CUG information from the call (i.e. continue the call as a non-CUG call).

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

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

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

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

$(end$(CAMEL3$)

<div style="border:2px solid black; text-align:center">

**\*\*\*\*Next Modified Section \*\*\*\***

</div>

## 18.9     Explicit Call Transfer (ECT)

An ECT call may include one or both call legs subject to CAMEL based services.

$(begin$(CAMEL3$)

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

$(end$(CAMEL3$)

**\*\*\*\*Next Modified Section \*\*\*\***

## 18.10     Completion of Call to Busy Subscriber (CCBS)

$(begin$(CAMEL3$)

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

$(end$(CAMEL3$)

**\*\*\*\*New Section \*\*\*\***

## 18.xx     Call Deflection

$(begin$(CAMEL3$)

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

$(end$(CAMEL3$)

**\*\*\*\*End of document \*\*\*\***

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| **22.078** | CR | **043** | Current Version: | 3.3.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ↑*　　　↑ *CR number as allocated by MCC support team*

| For submission to: | SA #8 | for approval | **X** | strategic | | *(for SMG* |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here ↑* | | for information | | non-strategic | | *use only)* |

*Form: CR cover sheet, version 2 for 3GPP and SMG*　*The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:** (U)SIM ☐　ME ☐　UTRAN / Radio ☐　Core Network **X**
*(at least one should be marked with an X)*

| **Source:** | CAMEL ad hoc | **Date:** | 9 May 2000 |
|---|---|---|---|

| **Subject:** | Removal of question marks from the A.1 information flow table |
|---|---|

| **Work item:** | CAMEL phase 3 |
|---|---|

| **Category:** | | F | Correction | | | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|---|---|
| | | A | Corresponds to a correction in an earlier release | | | | Release 96 | |
| *(only one category* | | B | Addition of feature | | | | Release 97 | |
| *shall be marked* | | C | Functional modification of feature | | | | Release 98 | |
| *with an X)* | | D | Editorial modification | **X** | | | Release 99 | **X** |
| | | | | | | | Release 00 | |

| **Reason for change:** | The information flow table had some question marks, which must be replaced by appropriate CAMEL phase indication. |
|---|---|

| **Clauses affected:** | |
|---|---|

| **Other specs affected:** | Other 3G core specifications | | → List of CRs: | |
|---|---|---|---|---|
| | Other GSM core specifications | | → List of CRs: | |
| | MS test specifications | | → List of CRs: | |
| | BSS test specifications | | → List of CRs: | |
| | O&M specifications | | → List of CRs: | |

| **Other comments:** | |
|---|---|

*CR22.078-043.doc*

+------------------------------------------------------------------+
|     ****   **FIRST and LAST MODIFIED SECTION**   ****            |
+------------------------------------------------------------------+

# 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 (!, 2, 3).

**Table A-1: Information transferred towards the CSE**

| | 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 | Unsuccessful call establishment (MT) | Incoming call request procedure | Procedures for serving network dialled services | Procedures for serving |
|---|---|---|---|---|---|---|---|---|---|
| Event met | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| IMSI | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Calling Party's Number | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Calling Party's Category | 1 | 1 | 3 | 3 | - | 3 | 1 | 3 | 3 |
| Additional Calling Party Number | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Called Party BCD Number | 1 | - | 3 | - | 3 | - | - | 3 | - |
| Called Party Number | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Original Called Party Number | - | 1 | - | 3[*1] | - | 3 | 1 | - | 3[*1] |
| Redirecting (Party) Number ???? | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Redirection Information | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Service Key | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| ISDN Bearer Capability | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| High Layer Compatibility | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Basic Service Code | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Call Identification Information | 1 | 1 | 3 | 3 | 3 | - | - | 23 | 23 |
| Location Information of the Calling Subscriber | 1 | - | 3 | - | 3 | - | - | 3 | - |
| Location Number of the Calling Subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Location information of the called subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Subscriber State of the called subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Cause - $(CAMEL3$) | - | - | - | - | 3 | 3 | - | - | - |
| Time and Time Zone Information - $(CAMEL2$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 23 | 23 |
| | | | | | | | | | |
| Calling Party LSA (if available) $(CAMEL3$) | 3 | - | 3 | - | - | - | - | 3 | - |
| MExE / SAT Free formatted information -$(CAMEL3$) | 3 | - | 3 | - | 3 | 3 | - | 3 | - |
| NAEA Carrier Identification Code (CIC) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| NAEA Carrier Selection Information (pre-subscribed or on-demand) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3 |
| CUG Index if received from the calling subscriber | 3 | - | - | - | - | - | - | - | - |
| CUG Interlock Code | - | 3 | - | - | - | - | 3 | - | - |
| CUG Outgoing Access Indicator | - | 3 | - | - | - | - | 3 | - | - |

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

[CR editor's note: S1 tdoc S1-99674 has no column for MT unsuccessful case. However, it indicates that some elements are supported in CAMEL ph 2 for unsuccessful cases. This fact needs clarification in future meetings.]

# 3G CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

**22.078** CR **044**     Current Version: 3.3.0

*3G specification number ↑*          *↑ CR number as allocated by 3G support team*

For submission to TSG    SA #8    for approval    **X**    *(only one box should*
*List TSG meeting no. here ↑*       for information         *be marked with an X)*

*Form: 3G CR cover sheet, version 1.0    The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

**Proposed change affects:**     USIM ☐     ME ☐     UTRAN ☐     Core Network ☐
*(at least one should be marked with an X)*

**Source:**     CAMEL ad hoc                                    **Date:**  11/05/2000

**Subject:**     Definition of Geodetic Information

**3G Work item:**     CAMEL Phase 3

**Category:**     F   Correction                                          **Release:**   Phase 2        ☐
                  A   Corresponds to a correction in an earlier release                  Release 96      ☐
*(only one category*     B   Addition of feature                                         Release 97      ☐
*shall be marked*        C   Functional modification of feature                          Release 98      ☐
*with an X)*             D   Editorial modification                      **X**           Release 99   **X**
                                                                                         Release 00      ☐

**Reason for change:**     The definitions of Location Area Code and Geodetic Information need to be added.

**Clauses affected:**     3

**Other specs affected:**     Other 3G core specifications   ☐   → List of CRs:
                              Other 2G core specifications   ☐   → List of CRs:
                              MS test specifications         ☐   → List of CRs:
                              BSS test specifications        ☐   → List of CRs:
                              O&M specifications             ☐   → List of CRs:

**Other comments:**     The definition of Geographical Information is also improved.

help.doc

<--------- Double-click here for help and instructions on how to create a CR.

---

**\*\*\*\*Modified Section \*\*\*\***

---

# 3 Definitions and abbreviations

…

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

**Location Information**: 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) indicates the location (latitude and longitude) of the served subscriber. wWhen Cell ID or Location Area Code is known,) the latitude and longitudethis 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 accuracyuncertainty of the indicated location information may also be providedis part of the geographical information

- **Geodetic Information:** (text to be added)provides the same functional capability as geographical information; however it is encoded differently

- **Cell ID:** indicates the global identity of the current or last cell which the subscriber is using or has used. 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**: identifier of the OSS which shall be transparent to the IPLMN/VPLMN

…

---

**\*\*\*\*End of document \*\*\*\***

---

# 3G TS 22.078 V3.3.0 (2000-03)

*Technical Specification*

# 3rd Generation Partnership Project;
# Technical Specification Group Services and System Aspects;
# Customised Applications for Mobile network Enhanced Logic (CAMEL);
# Service description, Stage 1
# (Release 2000)

Keywords

3GPP, SA

*3GPP*

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

# Contents

# Foreword

This Technical Specification (TS) has been produced by the 3$^{rd}$ Generation Partnership Project (3GPP).

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

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

Version x.y.z

where:

x   the first digit:

     1   presented to TSG for information;

     2   presented to TSG for approval;

     3   or greater indicates TSG approved document under change control.

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

z   the third digit is incremented when editorial only changes have been incorporated in the document.

# 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

The present document 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 and PDP contexts, to the control of HLR subscriber data, to the control of network signalling load - $(CAMEL3$).

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

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

The second phase of CAMEL 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 supplementary services (e.g 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:

-   Support of facilities to avoid overload situations.

-   Capabilities to support Dialled Services.

-   Capabilities to handle mobility events, such as (Not-)reachability and roaming.

-   Control of GPRS sessions and PDP contexts.

-   Control of circuit switched mobile originating SMS and packet switched mobile originating SMS.

-   Support of SoLSA. Support of Localised Service Area interworking is an optional feature. - $(CAMEL3$).

-   The CSE can be informed about the invocation of GSM supplementary services (CCBS) - $(CAMEL3$).

Detailed information can be found in the respective sections.

# 2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

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

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

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

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

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

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

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

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

# 3 Definitions and abbreviations

**Operator Specific Service (OSS)**: any service offered to a mobile user that is not standardised

**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)**: CSE is a logical entity which processes activities related to Operator Specific Services (OSS)

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

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

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

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

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

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

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

**Location Information**: 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.

- **Geodetic Information:** (text to be added)

- **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**: identifier of the OSS which shall be transparent to the IPLMN/VPLMN

**Subscriber Status**: 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 session:** Is the period where the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network. - $(CAMEL3$)

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

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

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

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

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

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

**NAEA:** North American Equal Access (NAEA). - $(CAMEL2$)

**Subscribed Dialled Services:** Identifies a set of maximum of ten service numbers. 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

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

The following CSI's may be administered per subscriber:

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

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

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

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

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

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

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

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

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

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

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

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

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

The Default Call Handling indicates whether the call shall be released or continued in case of the contact to the CSE is not confirmed or interrupted.

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

# 4.2   General Procedures

Each process is made up of a series of telecommunication events, some of which are service events. At a service event, the IPLMN or VPLMN may suspend the 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 are defined in the CAMEL Subscription Information. The CSE identity which corresponds to each initial service event is also defined in the CAMEL Subscription Information.

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

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

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

-   the CSI is received from the HPLMN; or

-   the CSE requests congestion control in the VPLMN or IPLMN; or - $(CAMEL3$).

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

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

-   Activate further subsequent service events for potential invocationto be reported to the CSE. 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 -$(CAMEL2$).

$(begin$(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;

- Continue the processing of the call with modified information, or;

- Connect the calling party to a specified called party, or;

- Release the call.

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

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

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

$(end$(CAMEL3$).

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

- Mobile Originated call (MO call);

- Mobile Terminated call in GMSC (MT call);

- Mobile Terminated call in VMSC (MT call); $(CAMEL3$);

- Mobile Forwarded call (MF call) - early call forwarding; early forwarded calls are treated as MO calls;

- Mobile Forwarded call (MF call) - late call forwarding; late forwarded calls are treated as MO calls;

- supplementary service invocation -$(CAMEL2$);

- USSD user interaction. The of service codes for CAMEL services can be allocated on subscriber basis or globally for all subscribers of the HPLMN. -$(CAMEL2$);

- MO SM service; both via MSC and SGSN of GPRS $(CAMEL3$);

- GPRS $(CAMEL3$);

- Mobility Management events $(CAMEL3$);

- Control of Subscription Data $(CAMEL3$).

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

# 4.3 Applicability of CAMEL Procedures

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

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

CAMEL procedures are applicable to circuit switched Mobile Originating Short Message Service and to packet switched Mobile Originating Short Message Service $(CAMEL3$).

# 5 Procedures for Mobile Originated Calls and Forwarded Calls

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

## 5.1 Initial service events

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

- Collection of dialled digits;

$(begin$(CAMEL3$).

- Analysis of dialled digits - $(CAMEL3$);

- Detection of unsuccessful call establishment - $(CAMEL3$).
  Unsuccessful call establishment may be caused by:

  - route select failure.

$(end$(CAMEL3$).

The definition of which of the above initial service events shall initiate contact with the CSE is part of the subscriber's CAMEL subscription information. Analysis of dialled digits can open a new dialogue regardless whether there exists a relationship or not. Upon detection of unsuccessful call establishment no new relationship is opened if there is already a dialogue open due to same CSI.

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

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

The following criteria may be defined.

### 5.2.1 CSI criteria applicable at call setup

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

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

- Criteria on the dialled number; these consist of:

  - The contents of the dialled number (a list of up to 10 dialled number strings may be defined in the criteria. Each dialled number string may be of any type of number (TON) format. supported by the access protocol); There is no restriction on the Number Plan Indicator (NPI).

  - The length of the dialled number (a list of up to three lengths may be defined).

- The criteria on the dialled number may be collectively defined to be either "enabling" triggering criteria or "inhibiting" triggering criteria (see below). The HPLMN may also choose not to define any criteria on the dialled number.

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

- A criterion on the type of call: this consists of defining whether or not the call must be a forwarded call.

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

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

- the dialled number matches a dialled number string defined in the criteria; or

- the length of the dialled number matches a dialled number length defined in the criteria.

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

- the dialled number does not match any of the dialled number strings defined in the critera; and

- the length of the dialled number is not the same as any dialled number length defined in the criteria.

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

- the two numbers are of the same Type Of Number (TON); and

- the two numbers have the same Number Plan Indicator (NPI); and

- the dialled number is at least as long as the dialled number string in the criteria; and

- all the digits in the dialled number string in the criteria match the leading digits of the dialled number.

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

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

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

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

- the criteria on the dialled number are satisfied; and

- the criterion on the basic service is satisfied; and

- the criterion on the type of call is satisfied.

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

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

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

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

- the two numbers are of the same Type Of Number (TON); and

- the two numbers have the same Number Plan Indicator (NPI); and

- the called number is at least as long as the called number string in the criteria; and

- all the digits in the called number string in the criteria match the leading digits of the called number.

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

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

## 5.3 Call set-up request procedure

## 5.3.1 Procedure when dialled digits have been collected

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

If (according to the CSI):

- the subscriber is provisioned with a CAMEL based originating service; and

- the call set-up request occurs; and

- the criteria are satisfied $(CAMEL2$).

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

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

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

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

- perform charging activities; $(CAMEL2$);

- activate ~~other~~ subsequent control service events for the call. The CSE shall have the possibility to send the following information:

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

        - Called party connection.

        - Call disconnection.

        - Calling party abandon -$(CAMEL2$).

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

    - The party in the call for which the event shall be detected and reported (calling or called party).

    - The type of monitoring (control or notification).

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

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

- bar the call (i.e. release the call prior to connection);

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

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

- 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);

- release the call;

- perform charging activities (the CSE is only allowed to include charging data in the Call Data Record);

- order in-band user interaction. (Interaction between the service triggered from previous triggering may be needed to avoid duplicated guidance etc.).

## 5.4 Calling party abandon $(CAMEL2$)

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

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

- notify the CSE and continue.

The following information shall be provided to the CSE:

- Event met.

- Type of monitoring.

The CSE shall send the following instruction:

- allow the call processing to continue unchanged.

$(begin$(CAMEL3$).

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

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

- perform charging activities.

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

- 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 an initial service event (according to the CSI); and

- the call attempt is unsuccessful; and

- the triggering criteria are satisfied.

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

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

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

- notify the CSE and continue call processing.

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

- Event met.

- Type of monitoring.

- Cause for unsuccessful call establishment:

    - not reachable;

    - busy;

    - no answer;

    - route select failure.

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

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

- perform charging activities;

- activate subsequent other control service events for the call. The CSE shall have the possibility to send the following information:

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

        - Called party connection.

        - Call disconnection.

        - Calling party abandon.

        - Unsuccessful call establishment. In thecase of no answer the CSE may provide a no answer timer.

    - The party in the call for which the event shall be detected and reported (calling or called party).

    - The type of monitoring (control or notification).

- Order in-band user interaction.

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

- 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 subsequent service event for this call and the called party connection event occurs the VPLMN/IPLMN shall:

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

- notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met.

- The party in the call for which the event is reported (only Called party applicable).

- Type of monitoring.

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

- perform charging activities;

- activate subsequent other control service events for the call. The CSE shall have the possibility to send the following information:

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

    - Call disconnection.

  - The party in the call for which the event shall be detected and reported (calling or called party);

  - The type of monitoring (control or notification).

- 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 Reserved section

## 5.8 Call disconnection procedure

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

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

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

- notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met;

- The party in the call for which the event is reported;

- Type of monitoring;

- Disconnection reason.

$(begin$(CAMEL2$).

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

- perform charging activities;

- activate subsequent ~~other~~ control service events for the call. The CSE shall have the possibility to send the following information:

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

        - Called party connection.

        - Call disconnection.

        - Calling party abandon.

        - Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer.

    - The party in the call for which the event shall be detected and reported (calling or called party).

    - The type of monitoring (control or notification).

- Order in-band user interaction.

$(end$(CAMEL2$).

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

- 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 originating VPLMN shall have reported an initial service event to the CSE and be waiting for instructions from the CSE, or

- the CSE shall ~~previously have activated~~ be waiting for the report of a~~ny~~ ~~of these~~ subsequent service event~~s~~ (with "Type of monitoring" set to control).

# 5.10 Reserved section

# 6 Procedures for Mobile Terminated Calls

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

In the following subclauses VPLMN applies to CAMEL3 only.

## 6.1 Initial service events

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

- Terminating Attempt Authorised.

$(begin$(CAMEL3$).

- Detection of unsuccessful call establishment.

    Unsuccessful call establishment may be caused by:

    - called subscriber busy;

    - called subscriber not reachable;

    - no answer from called subscriber.

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

$(end$(CAMEL3$).

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

### 6.2.1 CSI criteria applicable on terminating attempt authorisation

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

The following criterion may be defined:

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

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

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

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

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

## 6.3 Incoming call request procedure

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

If (according to the CSI):

- the subscriber is provisioned with a CAMEL based terminating service; and

- the incoming call request event occurs.

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

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

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

- perform charging activities; -$(CAMEL2$);

- activate subsequent other control service events for the call. The CSE shall have the possibility to send the following information:

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

    - Called party connection;

    - Call disconnection;

    - Calling party abandon -$(CAMEL2$);

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

  - The party in the call for which the event shall be detected and reported (calling or called party).

  - The type of monitoring (control or notification).

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

  $(begin$(CAMEL1$).

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

  $(end$(CAMEL1$).

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

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

- bar the call (i.e. release the call 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/VPLMN 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/VPLMN 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/VPLMN.

$(begin$(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 subsequent service event for this call in notify mode and the calling party abandon event occurs the IPLMN/VPLMN shall:

- notify the CSE and continue.

The following information shall be provided to the CSE:

- Event met.

- Type of monitoring.

$(begin$(CAMEL3$).

If the CSE has activated this subsequent service event for 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.

$(begin$(CAMEL3$).

If no relationship for the given call exists and

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

- the call attempt is unsuccessful; and

- the triggering criteria are satisfied;

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

$(end$(CAMEL3$).

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

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

- notify the CSE and continue call processing.

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

- Event met.

- Type of monitoring.

- Cause for unsuccessful call establishment:

- not reachable;

- busy;

- no answer;

- Forwarding notification.

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

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

- perform charging activities;

- activate subsequent other control service events for the call. The CSE shall have the possibility to send the following information:

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

    - Called party connection.

    - Call disconnection.

    - Calling party abandon.

    - Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer.

  - The party in the call for which the event shall be detected and reported (calling or called party).

  - The type of monitoring (control or notification).

- Order in-band user interaction.

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

- 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 subsequent service event for this call and  the called party connection event occurs, the IPLMN/VPLMN shall:

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

- notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met.

- The party in the call for which the event is reported (only Called party applicable).

- Type of monitoring.

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

- perform charging activities;$(CAMEL2$);

- activate subsequent ~~other~~ control service events for the call. The CSE shall have the possibility to send the following information:

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

        - (Call disconnection).

    - The party in the call for which the event shall be detected and reported (calling or called party).

    - The type of monitoring (control or notification).

- 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 Reserved section

# 6.8 Call disconnection procedure

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

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

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

- notify the CSE and continue call processing.

The following information shall be provided to the CSE:

- Event met.

- The party in the call for which the event is reported.

- Type of monitoring.

- Disconnection reason.

$(begin$(CAMEL2$).

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

- perform charging activities;

- activate subsequent ~~other~~ control service events for the call. The CSE shall have the possibility to send the following information:

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

        - Called party connection.

        - Call disconnection.

- Calling party abandon.

- Unsuccessful call establishment. In the case of no answer the CSE may provide a no answer timer.

- The party in the call for which the event shall be detected and reported (calling or called party).

- The type of monitoring (control or notification).

- Order in-band user interaction.

$(end$(CAMEL2$).

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

- 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 originating VPLMN shall have reported an initial service event to the CSE and be waiting for instructions from the CSE, or

- the CSE shall be waiting for the report of a subsequent service event (with "Type of monitoring" set to control).

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

## 7.1 Initiation of contact with the CSE

If:

- the call set up request occurs, and

- the call set up request procedure is passed, and

- the PLMN is provisioned with network based service information;

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

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

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

## 7.2 Further processing of the call

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

- 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);

- release the call;

- perform charging activities (the CSE is only allowed to include charging data in the Call Data Record);

- order in-band user interaction. (Interaction between the service triggered from previous triggering may be needed to avoid duplicated guidance etc.).

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

# 8 Reserved section

# 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.

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

If (according to the CSI) :

- the subscriber is provisioned with a CAMEL based SMS originating service; and

- the SMS set-up request occurs.

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

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

- Event met.

- IMSI.

- Short Message handling information:

- Validity Period Format.

- Status Report Request.

- User Data Header Indicator.

- Reply Path.

- Protocol Identifier.

- Data Coding Scheme.

- Validity Period.

- SMSC address.

- Calling Party's Number.

- Service Key.

- Location information of the calling subscriber.

- time and time zone.

-Called Party Number.

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

- perform charging activities;

- activate subsequent other control service events for the SM submission. The CSE shall have the possibility to send the following information:

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

    - Successful SM submission to the SMSC.

    - Unsuccessful SM submission to the SMSC.

- The type of monitoring.

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

- bar the SM submission;

- allow the submission to continue unchanged;

- allow the SMS submission 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.

## 9.2 Successful Short Message submission procedure

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

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

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

- Event met;

- Type of monitoring.

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

- perform charging activities.

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

- allow the processing to continue.

## 9.3 Unsuccessful Short Message submission procedure

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

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

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

- Event met;

- Type of monitoring.

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

- perform charging activities.

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

- allow the processing to continue.

# 9.4 Charging Procedures

## 9.4.1 Inclusion of Free Format data in CDR

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

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

- overwrite the existing data in the CDR with the newly received free format data, or

- append the newly received free format data to the existing data in the CDR.

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

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

## 10.1 Initial service events

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

- Attach procedure: a subscriber requests to register to the GPRS network.

- PDP 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.

- Change of Position Session: a subscriber who has an active GPRS Session changes position to another SGSN.

- Change of Position Context: a subscriber who has an active PDP Conext changes position to another SGSN.

## 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.

## 10.3 Attach procedure

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

If (according to the CSI) :

- the subscriber is provisioned with a CAMEL based service, relevant for GPRS data transmission; and

- the attach request is set as a trigger detection; and

- the attach request occurs.

Then, the VPLMN shall suspend attach processing, make contact with the 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 subsequent 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 subsequent service event which shall be detected and reported:

        - PDP activation/session establishment request.

        - PDP session establishment acknowledgement.

        - Change of position.

- PDP deactivation.

- Detach procedure.

- Type of monitoring.

- Perform charging activities (amongst others defining a data or time threshold).

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. 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 network. If either (according to the CSI):

- the subscriber is provisioned with a CAMEL based service relevant for GPRS data transmission; and

- the PDP activation request is set as a trigger detection; and

- the PDP Activation request occurs,

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

- the VPLMN shall 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 subsequent other control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:

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

    - Change of position.

    - PDP session establishment acknowledgement.

    - PDP deactivation procedure.

    - Detach procedure.

  - The type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold).

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

- release GPRS 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 confirmation from the GGSN to activate a Packet Data Protocol. 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 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

- the PDP Activation/Session Establishment Acknowledgement request occurs,

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

- the VPLMN shall 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 subsequent other control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:

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

    - Change of position.

    - PDP deactivation procedure.

    - Detach procedure.

    - Type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold).

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

- Release GPRS session or PDP Context;

- allow the processing to continue unchanged.

## 10.6 Change of Position Procedure

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 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 Volume or Time Threshold Procedure

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

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

- a maximum amount of data transmitted by and transmitted to the subscriber;

- a granted time to transmit and receive data.

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

- the total amount of data transmitted by and transmitted to the subscriber reaches the granted data volume or,

- the allowed time for the GPRS Session or PDP Context has elapsed.

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

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

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

- Charge result (elapsed time or total amount of data transmitted).

- The GPRS session or PDP Context for which the event is reported.

- GPRS Session or PDP Context-Active indicator.

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

- perform charging activities (including the defining of a new threshold or time limit);

- Aactivate subsequent control service events. The CSE shall have the possibility to send the following information:

  - the subsequent Sservice event which shall be detected and reported reported:.

    - PDP deactivation;.

    - Detach Procedure.

  - The GPRS session or PDP Context for which the event shall be monitored and reported.

- The type of monitoring (only monitor mode is allowed in this case).

[CR editor's note: please observe carefully the indent levels for the paragraphs above – they are an essential part of the CR]

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 be able to act as follows (provided the GPRS session or PDP context has not been released):

- release the GPRS session or PDP Context;

- allow the GPRS session or PDP Context to continue.

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

The following information shall be provided to the CSE:

- Event met;

- The GPRS session or PDP Context for which the event is reported;

- Type of monitoring.

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

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

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

    - Detach Procedure.;

  - the type of monitoring.;

- perform charging activities.

[CR editor's note: please observe carefully the indent levels for the paragraphs above – they are an essential part of the CR]

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

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

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

- Event met~~:~~.

- Type of monitoring.

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

- perform charging activities.

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

- allow the processing to continue unchanged.

# 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, there shall be a control relationship between the CSE and the GPRS session.

# 10.11 CSE Initiated PDP Context Deactivation Procedure

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

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

# 10.12 Change of Quality of Service Procedure

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

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

The following information shall be provided to the CSE.

- Charge result – this may be elapsed time or the total amount of data transmitted by and transmitted to the subscriber.

- Quality of Service.

- PDP ID.

- PDP Context state.

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

- perform charging activities (including the defining of a new threshold);

- a~~ctivate~~rm subsequent control service events. The CSE shall have the possibility to send the following information:

    - the subsequent S~~s~~ervice event which shall be detected and reported (including a GPRS session or PDP Context reference number):

        - PDP deactivation~~:~~.

        - Detach Procedure.

    - The GPRS session or PDP Context for which the event shall be monitored and reported.

- The type of monitoring (only monitor mode is allowed in this case).

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

Once the CSE has concluded issuing the above instructions, it shall be able to act as follows:

- release the GPRS session or PDP Context;

- allow the GPRS session or PDP Context to continue.

# 10.13   Charging Procedures

The CSE can perform the following charging activities.

## 10.13.1  Advice of Charge

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

## 10.13.2  Inclusion of Free Format data in CDR

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

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

- overwrite the existing free format data for that GPRS session or PDP Context, or

- append the newly received free format data to the existing free format data.

## 10.13.3  Specify a threshold for transmitted data or used time

See section 10.7.

## 10.13.4  Request notification of change in Quality of Service

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

# 11 Reserved section

# 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 to a different VLR service area.

- Location update within the same VLR service area.

- MS-initiated detach (MS switched off).

- Network initiated detach (periodic location update of MS failed).

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

The notification shall contain the following information if available:

- Event met.

-  Service Key.

- IMSI.

- Basic MSISDN.

- Location information.

- LSA identity.

- CAMEL phases supported at the VPLMN.

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

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

- CF SS data;

- CB SS data;

- ODB data;

- CAMEL subscription information.

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

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

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

- ECT.

- CD.

- MPTY.

- CCBS - $(CAMEL3$).

# 13 CSE control of subscription data

## 13.1 Any time interrogation

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

This may be information from the list below:

- subscriber status;

- location information (see section 22);

- call forwarding SS data $(CAMEL3$);

- call barring SS data $(CAMEL3$);

- operator determined barring data $(CAMEL3$);

- CAMEL subscription information $(CAMEL3$);

- CAMEL phases 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.

- Activation/Deactivation of 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.

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$)

## 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 TS 22.030 [3] and TS 22.090 [4]).

## 14.4 Reserved section

# 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 apply shall be the same for the control of e-values and for the control of the call duration;

- the tariff switch time is indicated to the network in 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 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 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.

## 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 has expired, i.e. release the call or allow the call to continue. In both cases, a charging report shall be sent to the CSE. The CSE shall also be able to instruct the IPLMN/VPLMN of a tone to be played before the maximum call period duration time is expired.

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 of e-parameters were received from the CSE, then the set of e-values is applicable from the beginning of the call, that is from the time the call is answered.

    - If two sets of e-parameters were received from the CSE, 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 subsequent other control service events for the call. The CSE shall have the possibility to send the following information:

    - The subsequent service event which shall be detected and reported (Call disconnection).

    - The party in the call for which the event shall be detected and reported (calling or called party).

    - The type of monitoring (control or notification).

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

- release the call;

- 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 active or inactive.

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.
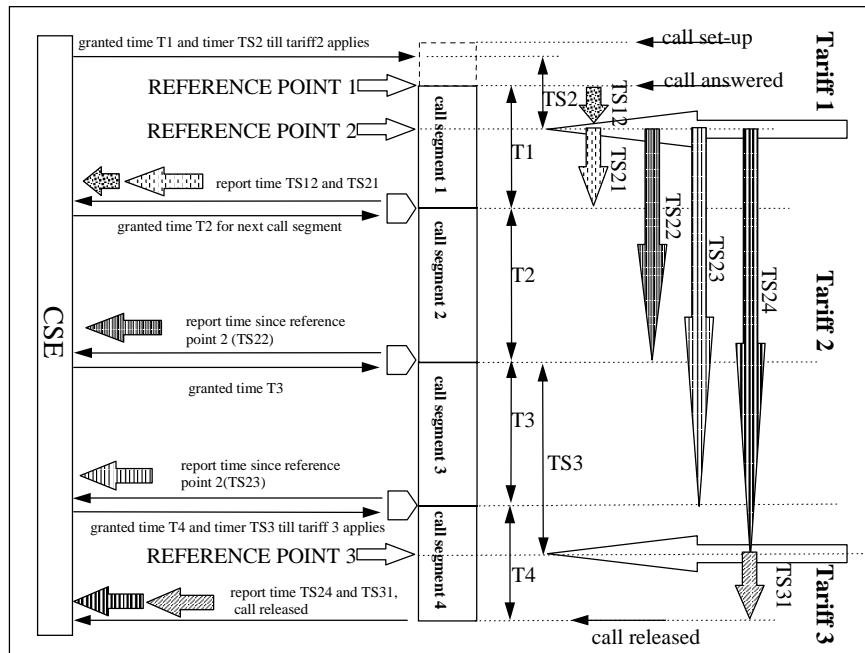
**Figure 1: CSE control of call duration**

**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 Tx (x is the number of the call period).
Timers indicating the duration until the next tariff applies are called TSx (x is the number of the tariff).
Timers indicating the elapsed time in a certain tariff are called TSxy (x is the number of the tariff and y is the elapsed time since the previous reference point).
When a call period is ended, the elapsed time in each tariff is reported 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 $(CAMEL3$)

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

In the case where the contact from the V/IPLMN is not confirmed by the CSE, the V/IPLMN shall proceed in accordance with the Default Call Handling, Default SMS Handling or Default Session Handling.

In the case where the congestion control denies the contact to the CSE, the V/IPLMN shall proceed in accordance to the Default Call Handling.

# 18 Interactions with supplementary services

## 18.1 General

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

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

For an MO call, the CSE shall be able to send to the VPLMN/IPLMN an indication that the presentation indicator shall be set to Withheld in the calling party number parameter.

### 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' 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 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 18.3.1).

$(begin$(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.

If no terminating CAMEL service is active then a new relationship is opened to the CSE prior to CF invocation. In order to open new relationship the failure reason criterion shall be checked. In order to check triggering criteria the forwarding PLMN shall derive reason code from call forwarding reason; this derived reason code is compared to the triggering criteria.

$(end$(CAMEL3$).

## 18.3.3 Call Forwarding on No Reply (CFNRy)

As for Call Forwarding on Busy (see subclause 18.3.1).

## 18.3.4 Call Forwarding on Not Reachable (CFNRc)

As for Call Forwarding on Busy (see subclause 18.3.1).

## 18.4 Call Completion

### 18.4.1 Call Hold (CH)

For both originating and terminating calls, the Call Hold service is invoked after the CAMEL feature is invoked. When a call is established the CSE shall instruct the VPLMN of the served subscriber whether Call Hold is possible.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)

Incoming, waiting calls are treated by the CSE as any other mobile terminating calls which encounter an idle subscriber. When a call is established the CSE shall instruct the VPLMN of the served subscriber whether Call Waiting is possible.

## 18.5 Multi Party (MPTY)

A multi party call may include one or more call legs subject to CAMEL based services. If a call leg is subject to CAMEL based services the CSE shall be able to instruct the VPLMN of the served subscriber whether that leg may be included in a multi party call.

## 18.6 Closed User Group (CUG)

The CSE shall decide whether to invoke the CUG supplementary service and shall perform the necessary processing for a Mobile Originated, Mobile Terminated or Forwarded call.When a terminating call with CUG information is received for a CAMEL marked subscriber 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 TS 22.086. CAMEL phase 2 allows CSE to modify e-values in MO calls only.

$(end$(CAMEL2$).

$(begin$(CAMEL3$).

If CAMEL phase 2 or 3 is supported and the phase 2 or 3 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 TS 22.068. CAMEL phase 3 allows CSE to modify e-values in MO and MT calls.

$(end$(CAMEL3$).

# 18.8 Call Barring

$(begin$(CAMEL2$).

NOTE: CAMEL may be used to establish forwarded-legs and CAMEL based re-routing-legs that violate conditional 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

### 18.8.1.1 Mobile originated calls

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

### 18.8.1.2 Forwarded Calls

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

[Editor's note: this may be TS 22.088 - 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 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)

An ECT call may include one or both call legs subject to CAMEL based services. If a call leg is subject to CAMEL based services the CSE shall be able to instruct the VPLMN of the served subscriber whether that leg may be included in an explicitly transferred call.

# 18.10 Completion of Call to Busy Subscriber (CCBS)

When a CCBS request is planted the CSE shall be able to instruct the VPLMN of the served subscriber whether CCBS is possible.18.11 Multiple Subscriber Profile (MSP).

See TS 22.097 [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$).

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 TS 22.079 [2].

# 21 Reserved section

*3GPP*

# 22 Location Information

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

The CSE may interrogate the HLR in order to obtain a particular subscriber's location based on the cell identity. The HLR may return the cell identity stored in the VLR ($CAMEL1$) or may return the current cell identity as a result of paging the subscriber ($CAMEL3$).

($begin(CAMEL3$).

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

($end(CAMEL3$).

# 23 Cross Phase compatibility with future Phases of CAMEL

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

# Annex A (normative): Information Tables

# A.1 Information provided to the CSE

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

**Table A-1: Information transferred towards the CSE**

| | 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 | Unsuccessful call establishment (MT) | Incoming call request procedure | Procedures for serving network dialled services 1 | Procedures for serving network dialled services 2 |
|---|---|---|---|---|---|---|---|---|---|
| Event met | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| IMSI | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Calling Party's Number | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Calling Party's Category | 1 | 1 | 3 | 3 | - | 3 | 1 | 3 | 3 |
| Additional Calling Party Number | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Called Party BCD Number | 1 | - | 3 | - | 3 | - | - | 3 | - |
| Called Party Number | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Original Called Party Number | - | 1 | - | $3^{*1}$ | - | 3 | 1 | - | $3^{*1}$ |
| Redirecting (Party) Number ???? | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Redirection Information | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Service Key | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| ISDN Bearer Capability | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| High Layer Compatibility | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Basic Service Code | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Call Identification Information | 1 | 1 | 3 | 3 | 3 | - | - | ? | ? |
| Location Information of the Calling Subscriber | 1 | - | 3 | - | 3 | - | - | 3 | - |
| Location Number of the Calling Subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Location information of the called subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Subscriber State of the called subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Cause - $(CAMEL3$) | - | - | - | - | 3 | 3 | - | - | - |
| Time and Time Zone Information - $(CAMEL2$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | ? | ? |
| | | | | | | | | | |
| Calling Party LSA (if available) $(CAMEL3$) | 3 | - | 3 | - | - | - | - | 3 | - |
| MExE / SAT Free formatted information  -$(CAMEL3$) | 3 | - | 3 | - | 3 | 3 | - | 3 | - |
| NAEA Carrier Identification Code (CIC) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| NAEA Carrier Selection Information (pre-subscribed or on-demand) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CUG Index if received from the calling subscriber | 3 | - | - | - | - | - | - | - | - |
| CUG Interlock Code | - | 3 | - | - | - | - | 3 | - | - |
| CUG Outgoing Access Indicator | - | 3 | - | - | - | - | 3 | - | - |

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

 [CR editor's note: S1 tdoc S1-99674 has no column for MT unsuccessful case. However, it indicates that some elements are supported in CAMEL ph 2 for unsuccessful cases. This fact needs clarification in future meetings.]

# 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).

**Table A-2: Information sent by the CSE**

|  | O a | O a | D n | O a |  | I n | D n | O a | P r |  |
|---|---|---|---|---|---|---|---|---|---|---|
| Called Party Number | 1 | 3 | 2 | 2 |  | 1 | 2 | 2 | 3 |  |
| Calling Party Number | - | - | - | - |  | - | - | - | - |  |
| Calling Party's Category | 1 | 3 | 2 | 2 |  | 1 | 2 | 2 | 3 |  |
| Calling IMSI | - | - | - | - |  | - | - | - | - |  |
| ISUP CUG information | - | - | - | - |  | - | - | - | - |  |
| Additional Calling Party's Number | 1 | 3 | 2 | 2 |  | 1 | 2 | 2 | 3 |  |
| Original Called Party Number | 1 | 3 | 2 | 2 |  | 1 | 2 | 2 | 3 |  |
| Redirection Party Number | 1 | 3 | 2 | 2 |  | 1 | 2 | 2 | 3 |  |
| Redirection Information | 1 | 3 | 2 | 2 |  | 1 | 2 | 2 | 3 |  |
| Alerting Pattern | - | - | - | - |  | 2 | - | - | - |  |
| ISDN Access releated Information | - | - | - | - |  | - | - | - | - |  |
| ISDN Bearer Capability | - | - | - | - |  | - | - | - | - |  |
| High Layer Compatibility | - | - | - | 3 |  | - | - | - | - |  |
| Basic Service Code | - | - | - | 3 |  | - | - | - | - |  |
| Called Party to be Created | - | - | - | - |  | - | - | - | - |  |
| New Call Segment | - | - | - | - |  | - | - | - | - |  |
| In Service Compatibility Response | - | - | - | - |  | - | - | - | - |  |
| Service Interaction Indicators Two | - | - | - | - |  | - | - | - | - |  |
| Location Number | - | - | - | - |  | - | - | - | - |  |
| NAEA Carrier Identification Code (CIC) - $(CAMEL2$) | 2 | 2 | 2 | 2 |  | 2 | 2 | 2 | 3 |  |
| NAEA Carrier Selection Information (pre-subscribed or on-demand) - $(CAMEL2$) | 2 | 2 | 2 | 2 |  | 2 | 2 | 2 | 3 |  |
| NAEA Originating Line Identification (OLI) - $(CAMEL2$) | 2 | 2 | 2 | 2 |  | 2 | 2 | 2 | 3 |  |
| NAEA Charge Number (CN) - $(CAMEL2$) | 2 | 2 | 2 | 2 |  | 2 | 2 | 2 | 3 |  |
| CSE Address | - | - | - | - |  | - | - | - | - |  |
| CUG Interlock Code | 3 | 3 | - | - |  | 3 | - | - | - |  |
| CUG Outgoing Access Indicator | 3 | 3 | - | - |  | 3 | - | - | - |  |
| Service Interaction Indicators | 3 | 3 |  |  |  | 3 |  |  |  |  |

# 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).

**Table A-3: GPRS Information transferred towards the CSE**

| | 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 |

# Annex B (informative): Change history

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

| Change history | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TSG SA# | SA Doc. | SA1 Doc | Spec | CR | Rev | Rel | Cat | Subject/Comment | Old | New |
| SP-07 | SP-000062 | S1-000167 | 22.078 | 035 | | R99 | F | Reduced scope of CAMEL Phase 3 in release 99 | 3.2.0 | 3.3.0 |
| SP-07 | SP-000123 | S1-000158 | 22.078 | 036 | | R99 | F | Correction of announcement capabilties | 3.2.0 | 3.3.0 |

# History

| Document history | | |
|---|---|---|
| V3.0.0 | July 1999 | Transferred to TSG SA at ETSI SMG#29. Under TSG TSG SA Change Control. |
| V3.1.0 | October 1999 | Inclusion of CRs at SA#05 |
| V3.2.0 | December 1999 | Inclusion of CRs at SA#06 |
| V3.3.0 | March 2000 | Inclusions of CRs at SA#07. |
| | | |

# CHANGE REQUEST

*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

| **22.078** | CR | **046** | Current Version: | 3.3.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number* ↑          ↑ *CR number as allocated by MCC support team*

| For submission to: | SA #8 | for approval | **X** | strategic | | *(for SMG* |
|---|---|---|---|---|---|---|
| *list expected approval meeting # here* ↑ | | for information | | non-strategic | | *use only)* |

*Form: CR cover sheet, version 2 for 3GPP and SMG          The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

**Proposed change affects:**          (U)SIM ☐   ME ☐   UTRAN / Radio ☐   Core Network **X**
*(at least one should be marked with an X)*

| **Source:** | CAMEL ad hoc | **Date:** | 11 May 2000 |
|---|---|---|---|

| **Subject:** | Update of CAMEL roaming issues (section 16) |
|---|---|

| **Work item:** | CAMEL phase 3 |
|---|---|

**Category:**

| | F | Correction | | **Release:** | Phase 2 | |
|---|---|---|---|---|---|---|
| *(only one category* | A | Corresponds to a correction in an earlier release | | | Release 96 | |
| *shall be marked* | B | Addition of feature | | | Release 97 | |
| *with an X)* | C | Functional modification of feature | | | Release 98 | |
| | D | Editorial modification | **X** | | Release 99 | **X** |
| | | | | | Release 00 | |

| **Reason for change:** | Section 16 is outdated. It should be more generic and future proof. Also CAMEL phase 3 issues should be covered, such as SMS, GPRS etc.<br>It is defined that the HLR may deny an incoming call attempt if the IPLMN (GMSC) does not support the appropriate CAMEL phase. This is not a new requirement, it rather clarifies the HLR/HPLMN options an operator or vendor can select. Similarly, the HPLMN may force the SendRoutingInformation (SRI) to be sent from the HPLMN GMSC by returning an "OR not allowed" error. |
|---|---|

| **Clauses affected:** | |
|---|---|

| **Other specs affected:** | Other 3G core specifications | | → List of CRs: | |
|---|---|---|---|---|
| | Other GSM core specifications | | → List of CRs: | |
| | MS test specifications | | → List of CRs: | |
| | BSS test specifications | | → List of CRs: | |
| | O&M specifications | | → List of CRs: | |

| **Other comments:** | |
|---|---|

*CR22.078-046.doc*

---

**\*\*\*\*    FIRST and LAST MODIFIED SECTION    \*\*\*\***

---

# 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 can decide on a per subscriber basis whether to allow roaming, or deny individual services (e.g. or to deny MO calls and/or MT calls (e.g. applying ODB, denying location up-date).

If the HPLMN allows MO callsroaming, 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

Ifn 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) if the HPLMN decides to allow the MT call attempt. The HPLMN may also decide to bar the incoming call attempt, or force the routeing interrogation to take place in the HPLMN.

## 16.3    Roaming in a VPLMN which supports a only CAMEL phase 1 lower phase of CAMEL$(CAMEL2$)

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 that is lower than subscribed the HPLMN shall take such action (including denying the registration request or transferring to the VPLMN subscription information appropriate to the CAMEL phase 1supported in the VPLMN) as may be decided by the HPLMN operator. If a certain service requires a certain CAMEL phase (e.g. MO SMS requires at minimumleast CAMEL phase 3) and the VPLMN does not support that CAMEL phase, the HPLMN may decide to deny roaming or allow roaming without that particular CAMEL OSS.

## 16.4    Call setup Service attempt from a VPLMN which supports a lower phase of CAMELonly CAMEL phase 1 $(CAMEL2$)

If the served subscriber requests a basic an MO callservice (call, short message, GPRS attach, GPRS PDP context etc.) which requires the VPLMN to contact the CSE, the VPLMN shall indicate to the CSE which phase of CAMEL has been negotiated between the HPLMN and the VPLMN supportsfor this service. If the VPLMN supports only CAMEL phase 1a CAMEL phase that is lower than that subscribed and the CSE determines that as a consequence a service which is provisioned for the subscriber will not operate correctly, the CSE shall take such action (including denying the call request or handling the call using only VPLMN supported CAMEL phase 1 capabilities supported in the VPLMN) as may be decided by the CSE operator.

## 16.5     Call setup from an IPLMN which supports ~~only~~ a lower phase of CAMEL ~~phase 1 $(CAMEL2$)~~

The IPLMN shall indicate to the HPLMN which phases of CAMEL it supports. The HPLMN may decide to bar the incoming call attempt before contacting the CSE, or force the routeing interrogation to take place in the HPLMN. When the IPLMN contacts the CSE for instructions to handle an MT call, the IPLMN shall indicate to the CSE ~~which~~ the phase of CAMEL ~~it supports~~which has been negotiated between the HPLMN and the IPLMN for this call. ~~prior tobefore~~ If the IPLMN supports ~~only~~a lower CAMEL phase ~~1~~than ~~subscribed~~negotiated between the HPLMN and the IPLMN and the CSE determines that as a consequence a service which is provisioned for the subscriber will not operate correctly, the CSE shall take such action (including denying the call request or handling the call using only ~~supported~~ CAMEL ~~phase 1~~ capabilities negotiated between the HPLMN and the IPLMN) as may be decided by the CSE operator.

**CHANGE REQUEST No :**          **047**          *Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM    22.078    Version:    3.3.0

Submitted to SMG    SA #8        for approval    **X**        without presentation ("non-strategic")
*list SMG plenary meeting no. here ↑*            for information                with presentation ("strategic")

*PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip*

**Proposed change affects:**        SIM         ME         Network    **X**
*(at least one should be marked with an X)*

**Work item:**    CAMEL Phase 3

**Source:**    CAMEL ad hoc                **Date:**    15/05/00

**Subject:**    Removal of Editor's notes and corrections to Annex 1

| **Category:** | | | **Release:** | |
|---|---|---|---|---|
| | F Correction | | Phase 2 | |
| | A Corresponds to a correction in an earlier release | | Release 96 | |
| *(one category* | B Addition of feature | | Release 97 | |
| *and one release* | C Functional modification of feature | | Release 98 | |
| *only shall be* | D Editorial modification | **X** | Release 99 | **X** |
| *marked with an X)* | | | UMTS | |

**Reason for change:**    This CR proposes the removal of outstanding editors' notes. In addition, tables A-1 and A-2 in Annex A now include a reference to the sections for which the columns are applicable.

**Clauses affected:**        18.8.1.2, 18.8.4, A.1, A.2

| **Other specs affected:** | | | |
|---|---|---|---|
| | Other releases of same spec | | → List of CRs: |
| | Other core specifications | | → List of CRs: |
| | MS test specifications / TBRs | | → List of CRs: |
| | BSS test specifications | | → List of CRs: |
| | O&M specifications | | → List of CRs: |

**Other comments:**    Outstanding editors' notes can be found at Section A.1 (Information provided to the CSE). It is not yet clear how this is to be resolved.

help.doc

<-------- double-click here for help and instructions on how to create a CR.

## 18.8.1 Barring of all outgoing calls

### 18.8.1.1 Mobile originated calls

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

### 18.8.1.2 Forwarded Calls

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

[Editor's note: this may be TS 22.088 - needs checking]

## 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.

# 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$)

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 TS 22.079 [2].

<div align="center">

**\*\*\*\*  NEXT MODIFIED SECTION   \*\*\*\***

</div>

# 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~~reflect the applicable Camel phase (1~~!~~, 2, 3).

| | Call set-up request procedure 1 (section 5.3.1 for MO calls) | Call set-up request procedure 2 (section 5.3.1 for CF calls) | Call set-up request procedure 3 (section 5.3.2.1 for MO calls) | Call set-up request procedure 4 (section 5.3.2.1 for CF calls) | Unsuccessful call establishment | Unsuccessful call establishment (MT) | Incoming call request procedure | Procedures for serving network dialled services 1 (section 7.1 MO calls) | Procedures for serving network dialled services 2 (section 7.1 CF calls) |
|---|---|---|---|---|---|---|---|---|---|
| Event met | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| IMSI | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Calling Party's Number | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Calling Party's Category | 1 | 1 | 3 | 3 | - | 3 | 1 | 3 | 3 |
| Additional Calling Party Number | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Called Party BCD Number | 1 | - | 3 | - | 3 | - | - | 3 | - |
| Called Party Number | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Original Called Party Number | - | 1 | - | 3[*1] | - | 3 | 1 | - | 3[*1] |
| Redirecting (Party) Number ???? | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Redirection Information | - | 1 | - | 3 | - | 3 | 1 | - | 3 |
| Service Key | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| ISDN Bearer Capability | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| High Layer Compatibility | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Basic Service Code | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| Call Identification Information | 1 | 1 | 3 | 3 | 3 | - | - | ? | ? |
| Location Information of the Calling Subscriber | 1 | - | 3 | - | 3 | - | - | 3 | - |
| Location Number of the Calling Subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Location information of the called subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Subscriber State of the called subscriber | - | - | - | - | - | 3 | 1 | - | - |
| Cause - $(CAMEL3$) | - | - | - | - | 3 | 3 | - | - | - |
| Time and Time Zone Information - $(CAMEL2$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | ? | ? |
| Calling Party LSA (if available) $(CAMEL3$) | 3 | - | 3 | - | - | - | - | 3 | - |
| NAEA Carrier Identification Code (CIC) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| NAEA Carrier Selection Information (pre-subscribed or on-demand) -$(CAMEL3$) | 2 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3 |
| CUG Index if received from the calling subscriber | 3 | - | - | - | - | - | - | - | - |
| CUG Interlock Code | - | 3 | - | - | - | - | 3 | - | - |
| CUG Outgoing Access Indicator | - | 3 | - | - | - | - | 3 | - | - |

**Table A-1: Information transferred towards the CSE**

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

# A.2 Information sent by the CSE

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

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

**Table A-2: Information sent by the CSE**

# A.3 GPRS Information provided to the CSE

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

| | Attach procedure | PDP activation / Session Establishment | PDP activation / Session Establishment Acknowledgement |
|---|---|---|---|
| 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, negotiated) | - | 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**

CR editor's note for MCC's attention: The above table has had its rows and columns resized to allow the correct display of the cell contents.

# 3G CHANGE REQUEST

**22.078** CR **048r2**          Current Version: 3.3.0

For submission to TSG _____          for approval  **X**
                                       for information ▢

**Proposed change affects:**          USIM ▢          ME ▢          UTRAN ▢          Core Network **X**

| | | | |
|---|---|---|---|
| **Source:** | Ericsson | **Date:** | 10 May 2000 |
| **Subject:** | Corrections to CAMEL interworking with GPRS | | |
| **3G Work item:** | CAMEL Phase 3 | | |

| **Category:** | F | Correction | **X** |
|---|---|---|---|
| | A | Corresponds to a correction in a 2G specification | |
| | B | Addition of feature | |
| | C | Functional modification of feature | |
| | D | Editorial modification | |

**Reason for change:**

Section 10 specifies the CAMEL interworking with GPRS.

However, is not clearly specified what information shall be reported to the CSE at various GPRS CAMEL Procedures and what actions the CSE may take.

The present CR addresses these deficiencies in the specification and presents an improvement to the text in chapter 10 and to the table in section A3.

See 'other comments' for a detailed explanation.

Changed since previous revision (Tdoc 0394):

- section 10 now specifies that PDP Context Establishment and PDP Context Establishment Ackwowledgement can be reported as *Initial Service Event* (in new PDP Context relationshationship) or *Subsequent Service Event* (in existing GPRS Session relationship), but not both.

- Usage of the wording 'Change of Position (Session)' and 'Change of Position (PDP Context)'.

- Usage of the wording '*Initial Service Event*' and '*Subsequent Service Event*'.

- Editorial changes in sect. 10.6.1.

- Sect. 10.6.2. now specifies what actions the CSE may take (arming events, performing charging activities) and what GPRS Session / PDP Context continuation instructions may be given (Continue, Release).

- Sect. 10.7 now specifies that GPRS Session related charging instructions may only be sent if the threshold was reported in a GPRS Session relationship.
  The Change of Position events may also be armed at threshold reporting.

- Sect. 10.8 now specifies that Change of Position (Session) may also be armed.

- Sect. 10.9 now specifies that only GPRS Session related charging instructions may be sent at Detach.

- Sect. 10.12 now specifies that when a change of QoS is reported, the CSE may also arm Change of Position or send Session related charging activities.

- Editorial correction to the 'other comments' section in the cover sheet.


Changed since previous revision (Tdoc 0399):

- usage of the terminology 'activate subsequent control service events' consistently.

- editorial correction

- section 10.6 specifies that the old GPRS relation shall be terminated at inter-SGSN hand-over

- section 10.7 specifies when data thresholds shall be available

- Table A-4 has been introduced

- A warning note has been added to table A-3 and table A-4

- 'GPRS Charging correlation ID' has been changed to 'GPRS Charging ID'


**Clauses affected:**     10, A.3

| **Other specs affected:** | Other 3G core specifications | | → List of CRs: |
| --- | --- | --- | --- |
| | Other 2G core specifications | | → List of CRs: |
| | MS test specifications | | → List of CRs: |
| | BSS test specifications | | → List of CRs: |
| | O&M specifications | | → List of CRs: |

**Other comments:**

Underneath follows a detailed explanation of the changes proposed in this CR.

Section 10.1

The following wording is used: "PDP Context Establishment" and "PDP Context Establishment Acknowledgment". These terms shall be used consistently in the specification.

Section 10.2

This section can be removed; there is no conditional triggering for GPRS. The section numbering in chapter 10 shall then be corrected.

Section 10.3

During processing of Attach, the CSE can not arm the PDP Context deactivation event. Reason is that the PDP Context deactivation can only be armed for a specific PDP Context. No PDP Context is yet Established at Attach, so this event can not be armed.

The Change of Position procedures shall use the wording "Change of Position (PDP Context)" and "Change of Position (Session)" consistently. Reason is that these procedures can be armed and reported separately. Therefore a clear distinction between the two is necessary.
During processing of Attach, only the Change of Position (Session) event can be armed; not the Change of Position (PDP Context) event, since there is no PDP Context yet.

During processing of Attach, charging activities may only pertain to the GPRS Session, not to a PDP Context, since there is no PDP Context yet.

Section 10.4

This section specifies the procedure 'PDP Context Establishment'. The PDP 'Context Establishment' event can be reported to the CSE in two possible ways:

(1)  as an *Initial Service Event*, resulting in a new control relationship between the CSE and the newly established PDP Context.

(2)  as a *Subsequent Service Event* within and existing control relationship between the CSE and the GPRS Session of which the newly established PDP Context is part.

This distinction shall be reflected in the structure of section 10.4 (division in sect. 10.4.1 and 10.4.2). Which elements are reported to the CSE depends on the scenario. Table A3 has separate columns for these two scenario's.

Section 10.4.1

When the PDP Context Establishment is reported as Initial Service event, then only events pertaining to the PDP Context may be armed through the relationship between the CSE and that PDP Context. The CSE can not arm events pertaining to the GPRS Session, through this dialogue.

The same restriction applies to the charging activities and the actions by the CSE. Only the PDP Context may be released, not the GPRS Session.

Section 10.4.2

When the PDP Establishment is reported within a GPRS Session dialogue, then the CSE may arm events that pertain to the GPRS Session and events that pertain to the PDP Context.

The charging actions may apply to the GPRS Session or to the PDP Context.

The actions from the CSE may apply to the GPRS Session and to the PDP Context.

Section 10.5

This section specifies the procedure 'PDP Context Establishment Acknowledgement'. The PDP 'Context Establishment' event can be reported to the CSE in four possible ways:

(1)  as an *Initial Service Event*, resulting in a new control relationship between the CSE and the newly established and acknowledged PDP Context. (Sect. 10.5.1)

(2)    as a *Subsequent Service Event* within an existing control relationship between the CSE and the PDP Context. (Sect. 10.5.2)

(3)    as a *Subsequent Service Event* within an existing control relationship between the CSE and the GPRS Session of which the newly established and acknowledged PDP Context is part. The PDP Context establishment event for this PDP Context was not reported to the CSE. (Sect. 10.5.3)

(4)    as a *Subsequent Service Event* within an existing control relationship between the CSE and the GPRS Session of which the newly established and acknowledged PDP Context is part. The PDP Context establishment event for this PDP Context was reported to the CSE. (Sect. 10.5.4)

This distinction shall be reflected in the structure of section 10.5 (division in sect. 10.5.1 to 10.5.4). Which elements are reported to the CSE depends on the scenario. Table A3 has separate columns for these scenario's.

Section 10.5.1

When the PDP Context Establishment Acknowledgement is reported as Initial Service event, then only events pertaining to the PDP Context may be armed through the relationship between the CSE and that PDP Context. The CSE can not arm events pertaining to the GPRS Session, through this relationship.

The same restriction applies to the charging activities and the actions by the CSE.

Only the PDP Context may be released, not the GPRS Session.

Section 10.5.2

When the PDP Context Establishment Acknowledgement is reported as Subsequent Service Event in a PDP Context relationship, then only events pertaining to the PDP Context may be armed this relationship. The CSE can not arm events pertaining to the GPRS Session, through this relationship.

The same restriction applies to the charging activities and the actions by the CSE.

Only the PDP Context may be released, not the GPRS Session.

Section 10.5.3

Sect. 10.5.3 describes the permissable actions when the PDP Context Establishment Acknowledgement is reported as subsequent Service Event in a GPRS Session relationship and the PDP Context Establishment event for this PDP Context was not reported to the CSE, within this GPRS Session relationship.

In this case, the CSE may arm events for the PDP Context and for the GPRS Session.

The charging activities may apply to the PDP Context or to the GPRS Session.

The CSE may release the PDP Context or the GPRS Session.

Section 10.5.4

Sect. 10.5.4 describes the permissable actions when the PDP Context Establishment Acknowledgement is reported as Subsequent Service Event in a GPRS Session relationship and the PDP Context Establishment event for this PDP Context was reported to the CSE, within this GPRS Session relationship.

In this case, the CSE may arm events for the PDP Context and for the GPRS Session.

The charging activities may apply to the PDP Context or to the GPRS Session.

The CSE may release the PDP Context or the GPRS GPRS Session.

Section 10.6

The wording in sect. 10.6 shall reflect the distinction between intra-SGSN change-of-position and inter-SGSN change-of-position. The processing of these procedures are distinctively different. Section 10.6 has therefore been split up in two sub sections.
In the case of inter-SGSN change-over, the previous relation shall be terminated.

Table A-4 has been added in Annex A to list the information elements that shall be reported to the CSE.

Section 10.6.1

The intra-SGSN procedure is a *Subsequent Service Event*. It consists of a notification only.

Section 10.6.2

The inter-SGSN procedure is an *Initial Service Event*. The MSISDN, IMSI and Service Key are needed in the SCP to correlate this Initial Service with the service which was already running in the SCP. The Service key is obtained from the static arming in the subscription information sent to the SGSN.

This procedure is an Initial Service Event. Therefore, all available information shall be sent to the CSE, even though the event occurs after PDP Context Establishment Acknowledgement.

Table A-4 has been added in Annex A to list the information elements that shall be reported to the CSE.

Section 10.7

Some rewording is required to emphasise that the charging threshold is either for a GPRS Session or for a PDP Context.

The CSE may arm events when a threshol is reported. However, the CSE may only arm events for the GPRS Session when the threshold message was sent within a GPRS Session dialogue.

The CSE may only release the GPRS Session when the threshold message was sent within a GPRS Session dialogue.

The CR also clarifies when the first threshold for the Session or PDP Context shall be available.

Section 10.8

As part of the PDP deactivation procedure, the SGSN reports only the PDP Context which was deactivated.

When the CSE arms events during as part of the PDP deactivation procedure, it may only arm events for the GPRS Session if the PDP deactivation was reported within a GPRS Session dialogue.

The CSE may only release the GPRS Session when the PDP deactivation was reported within a GPRS Session dialogue.

Section 10.9

Slight rewording was needed.

Section 10.10

The CSE Initiated GPRS Detach procedure is only applicable for a Service that is the result of a GPRS Attach procedure.
When a Service is started with a PDP Context activation procedure, then the CSE can not initiate a GPRS Detach.

Section 10.11

The CSE may initiate a PDP Context Deactivation when the PDP Context Establishment or the PDP Context Establishment Acknowledgement has been reported to the CSE.

Section 10.12

The Quality of Service procedure is applicable to one specific PDP Context. This shall be clearly specified.

It is not needed to list 'PDP Id' as element that shall be reported to the CSE. This is an implementation issue. It is used for most operations, but it is not mentioned elsewhere either.
Same applies to 'GPRS session or PDFP Context reference'.

The CSE may only arm Detach if the change of QoS is reported within a GPRS Session dialogue.

When the CSE requests the monitoring and reporting of a change of QoS, then this can only be requested for a PDP Context, not for a GPRS Session.

The CSE may only release the GPRS Session when the change in QoS was reported within a GPRS Session dialogue.

Section A.3

Unused rows shall be removed from the table.

The row Quality of Service (subscribed, requested, negotiated) shall be split in individual entries.

The reporting of elements follows the following general rules:

- PDP Transport Protocol, destination address information, requested QoS and subscribed QoS shall be reported in the PDP Context Establishment procedure.
  If PDP Context Establishment is not armed, then these elements shall be reported in the PDP Context Establishment Acknowledgement procedure.

- Negotiated QoS and Charging Id shall always be reported in PDP Context Establishment Acknowledgement procedure. These elements are only known at the time of Acknowledgement.

- IMSI, MSISDN, Service Key and GPRS MS Class shall be reported in Initial Service Events. Thereafter, they shall not be reported again.

- Time Information and Location Information shall be reported at Attach and at PDP Context Establishment.
  These elements shall also be reported in the PDP Context Establishment Acknowledgement, in the case that PDP Context Establishment was not armed for this PDP Context.

- To follow the general principle, additional columns were introduced for the Change Of Position Procedure (Table A-4).

- Since the 'GPRS charging correlation ID' is not further identified to correlate charging records, but more the GGSN charging ID, the name is changed to 'GPRS Charging ID'.

- The sub-information 'MS RadioAccessCapability' (as part of the MS GPRS class) is not supported in UMTS Network. A note is introduced to warn the reader.

> ****First Modified Section ****

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

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

## 10.1 Initial service events

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

- Attach procedure: a subscriber requests to register to the GPRS network.

- PDP ~~Activation / Session~~Context Establishment: a subscriber requests the activation of a Packet Data Protocol Context.

- PDP ~~Activation / Session~~Context Establishment Acknowledgement: the SGSN has received an acknowledgement from the GGSN for that request.

- Change of Position (Session): a subscriber who has an active GPRS Session changes position to another SGSN.

- Change of Position (PDP Context): a subscriber who has an active PDP Conext changes position to another SGSN.

## ~~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.~~

## 10.3 Attach procedure

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

If (according to the CSI)~~-~~:

- the subscriber is provisioned with a CAMEL based service, relevant for GPRS data transmission; and

- the attach request is set as a trigger detection; and

- the attach request occurs.

Then, the VPLMN shall suspend attach processing, make contact with the 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~~ subsequent control service events for the period being attached to the data network. The CSE shall have the possibility to send the following information:

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

    - PDP ~~activation/session~~Context ~~Ee~~stablishment request.

    - PDP ~~session~~ Context ~~Ee~~stablishment ~~Aa~~cknowledgement.

    - Change of position (Session).

    - ~~PDP deactivation.~~

    - Detach ~~procedure~~.

  - Type of monitoring.

- Perform charging activities (amongst others defining a data or time threshold) The charging activities shall apply to the GPRS Session.

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

- Reject the attachment request.

- Allow the processing to continue unchanged.

## 10.4 ~~PDP activation / Session Establishment~~PDP Context Establishment

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

- the subscriber is provisioned with a CAMEL based service relevant for GPRS data transmission; and

- the PDP activation request is set as a trigger detection; and

- the PDP Activation request occurs,

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

- the VPLMN shall suspend processing, make contact with the CSE and await further instructions, or,

- send a notification and continue.

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

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

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

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

## 10.4.1 PDP Context Establishment reported as Initial Service Event

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

- activate ~~other control~~subsequent control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:

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

        - Change of position (PDP Context).

        - PDP ~~session~~ Context ~~E~~establishment ~~A~~acknowledgement.

        - PDP deactivation ~~procedure~~.

        - ~~Detach procedure.~~

    - The type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold).
  The charging activities shall apply to the PDP Context.

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

- release PDP Context~~GPRS 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.

## 10.4.2 PDP Context Establishment reported as Subsequent Service Event

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

- activate ~~other control~~subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:

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

        - PDP Context Establishment Acknowledgement.

        - Change of position (PDP Context).

        - PDP deactivation.

        - Change of Position (Session).

        - Detach.

    - The type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold).

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

- release PDP Context;

- release GPRS 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~~PDP Context Establishment Acknowledgement

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

If either (according to the CSI)~~-~~:

- the subscriber is provisioned with a CAMEL based service relevant for GPRS data transmission; and

- the PDP ~~activation / session~~Context Eestablishment Aacknowledgement is set as a trigger detection point; and

- the PDP ~~Activation/Session~~Context Establishment Acknowledgement request occurs,

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

- the VPLMN shall suspend processing, make contact with the CSE and await further instructions, or,

- send a notification and continue.

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

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

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

- The column marked as '*Subsequent Service Event – PDP Context*' control relationship' indicates the elements to be reported when the PDP Context Establishment Acknowledgment is reported as *Subsequent Service Event* within a PDP Context control relationship.

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

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

## 10.5.1 PDP Context Establishment Acknowledgement reported as Initial Service Event

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

- activate ~~other control~~subsequent control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:

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

        - Change of position (PDP Context).

        - PDP deactivation ~~procedure~~.

        ~~- Detach procedure.~~

    - Type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold). The charging activities shall apply to the PDP Context.

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

- ~~r~~Release ~~GPRS session or~~ PDP Context;

- allow the processing to continue unchanged.

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

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

- activate ~~other control~~subsequent control service events for the life of the PDP context. The CSE shall have the possibility to send the following information:

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

        - Change of position (PDP Context).

        - PDP deactivation.

    - Type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold). The charging activities shall apply to the PDP Context.

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

- ~~r~~Release PDP Context;

- allow the processing to continue unchanged.

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

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

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

- activate ~~other control~~subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:

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

    - Change of position (PDP Context).

    - PDP deactivation.

    - Change of Position (Session).

    - Detach.

  - Type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold).

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

- release PDP Context;

- release GPRS Session;

- allow the processing to continue unchanged.

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

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

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

- activate ~~other control~~subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:

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

      - Change of position (PDP Context).

      - PDP deactivation.

      - Change of Position (Session).

      - Detach.

    - Type of monitoring.

  - Perform Charging Activities (amongst others defining a data or time threshold).

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

- r~~R~~elease PDP Context;

- release GPRS Session;

- allow the processing to continue unchanged.

# 10.6 Change of Position Procedure

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~~. A change of position can be an intra-SGSN routeing area update (update within the same SGSN) or an inter-SGSN routeing area update (update from one SGSN to another SGSN).

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

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

## 10.6.1 Intra-SGSN Change of Position

If the CSE has activated this service event and a ~~request to~~ change ~~the~~of 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.~~

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

## 10.6.2 Inter-SGSN Change of Position

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

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

~~Event met~~

~~MSISDN~~

~~IMSI~~

~~Service Key~~

~~New Routeing Area~~

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

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

- activate subsequent control service events for the life of the PDP context or GPRS Session. The CSE shall have the possibility to send the following information:

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

    - PDP Context Establishment.

    - PDP Context Establishment Ackwowledgement.

    - Change of position (PDP Context).

    - PDP deactivation.

- Change of Position (Session).
This subsequent service event may ~~only~~ be armed only if the Change of Position Initial Service Event was reported for a GPRS Session.

- Detach.
This subsequent service event may ~~only~~ be armed only if the Change of Position Initial Service Event was reported for a GPRS Session.

- Type of monitoring.

- Perform Charging Activities (amongst others defining a data or time threshold).
GPRS Session related charging activities may ~~only~~ be instructed only if the Change of Position Initial Service Event was reported for a GPRS Session.

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

- release PDP Context;

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

- allow the processing to continue unchanged.

## 10.7 Data Volume or Time Threshold Procedure

The purpose of this procedure is to control the amount of data transmitted by and transmitted to the served subscriber or the used time per GPRS Session or PDP Context. The threshold is valid either for ~~one the~~ a GPRS session or for one PDP Context of the subscriber only. If the subscriber controls simultaneous ~~GPRS sessions~~ PDP Contexts, thresholds per GPRS session or PDP Context ~~have to~~ may be defined.
For correct performance, the threshold shall be available for the first time as a response to GPRS Session establishment (if valid for the GPRS Session) or as a response to PDP Context Establishment (if valid for the PDP Context). Subsequent thresholds may be received immediately after the expiry of the previous threshold or at change of QoS.

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

- a maximum amount of data transmitted by and transmitted to the subscriber;

- a granted time to transmit and receive data.

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

- the total amount of data transmitted by and transmitted to the subscriber reaches the granted data volume or,

- the allowed time for the GPRS Session or PDP Context has elapsed.

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

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

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

- Charge result (elapsed time or total amount of data transmitted).

- The GPRS session or PDP Context for which the event is reported.

- GPRS Session or PDP Context-Active indicator.

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

- perform charging activities (including the defining of a new threshold or time limit);
  GPRS Session related charging activities may ~~only~~ be sent only if a GPRS Session related charging threshold was reported.

- Activate ~~control service~~subsequent control service events for the PDP Context or GPRS Session. The CSE shall have the possibility to send the following information:

  - the subsequent s~~S~~ervice event which shall be detected and reported ~~reported~~.

    - PDP deactivation.

    - Change of Position (PDP Context);

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

    - Detach ~~Procedure~~; this event may ~~only~~ be armed only if the data or time threshold event is reported within a GPRS Session relationship.

  - The GPRS session or PDP Context for which the event shall be monitored and reported.

  - The type of monitoring (only monitor mode is allowed in this case).

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

Once the CSE has concluded issuing the above instructions, it shall ~~be able to act as follows~~issue one and only one of the following instructions (provided the GPRS session or PDP context has not been released):

- ~~release the GPRS session or PDP Context;~~

- release PDP Context.

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

- allow the GPRS session or PDP Context to continue.

# 10.8 PDP deactivation ~~/ Session Release~~Procedure

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

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

The following information shall be provided to the CSE:

- Event met.

- The ~~GPRS session or~~ PDP Context for which the event is.

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

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

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

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

- the type of monitoring;

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

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

- allow the processing to continue unchanged.

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

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

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

- Event met.

- Type of monitoring.

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

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

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

- allow the processing to continue unchanged.

## 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 a GPRS detach at any time.

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

## 10.11 CSE Initiated PDP Context Deactivation Procedure

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

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

## 10.12 Change of Quality of Service Procedure

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

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

The following information shall be provided to the CSE.

- Charge result – this may be elapsed time or the total amount of data transmitted by and transmitted to the subscriber.

- Quality of Service.

- PDP ID.

- PDP Context state.

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

- perform charging activities (including the defining of a new threshold);
  GPRS Session related charging instructions may only be sent only if the change of PDP Context QoS event is reported within a GPRS Session relationship.

- activatearm control subsequent control service events for the PDP Context or GPRS Session. The CSE shall have the possibility to send the following information:

  - the subsequent sService event which shall be detected and reported (including a GPRS session or PDP Context reference number):

    - PDP deactivation.

    - Change of Position (PDP Context).

    - Change of Position (Session); this event may only be armed only if the change of PDP Context QoS event is reported within a GPRS Session relationship.

    - Detach Procedure; this event may only be armed only if the change of PDP Context QoS event is reported within a GPRS Session relationship.

  - The GPRS session or PDP Context for which the event shall be monitored and reported.

  - The type of monitoring (only monitor mode is allowed in this case).

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

Once the CSE has concluded issuing the above instructions, it shall be able to act as followsissue one and only one of the following instructions:

- release the GPRS session or PDP Context;

- release PDP Context.

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

- allow the ~~GPRS session or~~ PDP Context to continue.

# 10.13 Charging Procedures

The CSE can perform the following charging activities.

## 10.13.1 Advice of Charge

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

## 10.13.2 Inclusion of Free Format data in CDR

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

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

- overwrite the existing free format data for that GPRS session or PDP Context, or

- append the newly received free format data to the existing free format data.

## 10.13.3 Specify a threshold for transmitted data or used time

See section 10.7.

## 10.13.4 Request notification of change in Quality of Service

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

> ****Next Modified Section ****

# A.3 GPRS Information provided to the CSE

The following tableTable A-3 shows the information that is shall be transferred reported towards to the CSE on various GPRS events. The numbers are reflecting the applicable Camel CAMEL phase (3).

**Table A-3: GPRS Information transferred reported towards to the CSE**

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

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

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

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

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

**Table A-4: GPRS Information reported to the CSE**

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

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

## ****End of document ****