

**Source:** SA1  
**Title:** Various CRs to 22.078  
**Document for:** Approval  
**Agenda Item:** 7.1.3

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Doc-1st-Level	Spec	CR	Rev	Phase	Cat	Subject	Vers	Vers New	Doc-2nd-Level
SP-010432	22.078	112	3	Rel-5	B	Enhanced charging for Call Party Handling. 22.078-112; Rel 5; F	5.3.0	5.4.0	S1-010782
SP-010432	22.078	113	2	Rel-5	F	CR to 22.078 (Rel-5) on Introduction of definitions for CPH 22.078-113; Rel 5; F	5.3.0	5.4.0	S1-010851
SP-010432	22.078	114	1	Rel-5	F	CR to 22.078 (Rel-5) on Editorial corrections to subclause 8.1. 22.078-114; Rel 5; F	5.3.0	5.4.0	S1-010691
SP-010432	22.078	115	1	Rel-5	B	Introduction service requirements for CAMEL interworking with the IP multimedia subsystem 22.078-115; Rel 5; B	5.3.0	5.4.0	S1-010873
SP-010432	22.078	116		Rel-5	C	CR additional procedure description to Charging Notification 22.078-116; Rel 5; C	5.3.0	5.4.0	S1-010693
SP-010432	22.078	118		Rel-5	C	CR additional information called party connection procedure 22.078-118; Rel 5; C	5.3.0	5.4.0	S1-010695
SP-010432	22.078	119	2	Rel-5	B	Tones support for CAMEL phase 4	5.3.0	5.4.0	S1-010852
SP-010432	22.078	120		Rel-5	F	Correction of on line charging procedures in case of CPH	5.3.0	5.4.0	S1-010806
SP-010432	22.078	121	1	Rel-5	B	Applicability of CAMEL to IMS	5.3.0	5.4.0	S1-010853
SP-010432	22.078	122	1	Rel-5	B	Applicability of CAMEL to IP Multimedia sessions	5.3.0	5.4.0	S1-010878
SP-010432	22.078	123		Rel-5	B	CAMEL and IM application registration	5.3.0	5.4.0	S1-010666

3GPP TSG-SA1 CAMEL Adhoc Meeting  
 Dallas, Texas, USA, 26 - 28 June 2001

Tdoc S1C010129

<small>CR-Form-v3</small>
<h2 style="margin: 0;">CHANGE REQUEST</h2>
⌘ <b>22.078 CR 112</b> ⌘ rev <b>3</b> ⌘ Current version: <b>5.3.0</b> ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Enhanced charging for Call Party Handling and further general charging clarifications		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13/07/01
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ Rel-5
	Use <u>one</u> of the following categories: <b>F</b> (essential correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

<b>Reason for change:</b>	⌘ Currently the charging aspects in respect to the CAMEL Phase 4 Call Party Handling are not considered. Furtheron, some previous CAMEL Phases functionality needs to be indicated more clearly to be consistent with the proposed changes due to the CPH charging impact.
<b>Summary of change:</b>	⌘ <ul style="list-style-type: none"> <li>- This CR specifies the charging aspects in respect to the CAMEL Phase 4 Call Party Handling enhancements.</li> <li>- Include in Clause 8 that charging activities in respect to CPH are described in Clause 15.</li> <li>- Indicate that the tariff switch timers for the control of e-values and for the control of the call duration are provided by the CSE. They may be different.</li> <li>- The "CSE control of call duration" is applicable per call leg.</li> <li>- CSE controlled e-values represent the charge applicable to the CPH configuration.</li> <li>- The SCI tariff switch is always accompanied with a set of e-values.</li> <li>- Indicate that "Inclusion in charging records of information received from the CSE" and "Support of additional charging information to the CSE" is applicable per call leg (as in CAMEL Phase 3 already).</li> <li>- Indicate that "CSE controlled e-values" are only applicable for the served subscriber (as in CAMEL Phase 3 already).</li> <li>- Indicate that for "CSE control of call duration" it is possible to receive a maximum call period and sets of e-values without receiving a tariff switch timer (as in CAMEL Phase 3).</li> <li>- In figure 1, TS3 is not correct, as it should starting at the start of T4 and ends at reference point 3.</li> </ul>

<b>Consequences if not approved:</b>	⌘	The charging of CAMEL in respect to individual call parties is not possible.	
<b>Clauses affected:</b>	⌘	Clauses 8, 15 and the subclauses of clause 15.	
<b>Other specs affected:</b>	⌘	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘
<b>Other comments:</b>	⌘	Some additional editorial changes are made too.	

**\*\*\*\* First modified section \*\*\*\***

## 8 Procedures for Call Party Handling - \$(CAMEL4\$)

CPH procedures only apply to speech telephony (TS11) as defined in TS 22.003 [10].

CPH procedures apply to MO, MF, MT, VT and CSE initiated calls. If the served subscriber is involved in a CPH configuration controlled by her CSE, then any further MO or MT call setup request involving the served subscriber shall be handled by a separate relationship with the served subscriber's CSE. This new relationship may lead to the creation of a further CPH configuration for the served subscriber. The service logic for one CSE relationship is not necessarily aware of what is happening in another CSE relationship involving the same served subscriber.

It is not required to transfer a leg or a group of legs between separate CPH configurations.

Where service logic involves Call Party Handling procedures, the Service Interaction Indicators Two parameter should be used to manage interactions with GSM Supplementary Services (CF, CD and MPTY for each call leg and ECT and HOLD for the served subscriber).

The CSE shall be able to add parties to, or remove parties from, the group. Each party in this group can communicate with all other parties in the group. The IPLMN/VPLMN shall support at least 6 parties (of which one may be a Specialised Resource Function) in a group.

If a control relationship exists, the CSE may order in-band user interaction with any held call party at any point during the active phase of the call leg.

Charging activities shall be possible during a CPH configuration as indicated in clause 15.

**\*\*\*\* Next modified section \*\*\*\***

## 15 Charging Activities

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

- Calls may be divided into call periods for the purpose of controlling the call duration;
- The management and the control of a tariff switches ~~which applies to subscriber charging~~ ~~is~~ under the responsibility of the HPLMN. ~~There may be a tariff switch for the CSE control of e-values and separate tariff switches for the control of call duration (which apply per call leg).~~ The time at which these tariff switches apply shall be the same may differ for the CSE control of e-values and for and for the control of the call duration;
- The tariff switch time is indicated to the network in the form of a time relative to the reception of the instruction.
- In a CPH configuration, the following procedures shall apply per call party:
  - Inclusion in charging records of information received from the CSE (subclause 15.2);
  - Support of additional charging information to the CSE (subclause 15.3);
  - CSE control of call duration (subclause 15.4).
- The e values sent by the CSE are reported only to the served subscriber and only if this subscriber is connected to the CPH configuration (subclause 15.1).

## 15.1 CSE controlled e-values

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

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

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

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

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

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

## 15.2 Inclusion in charging records of information received from the CSE

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

## 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~~ termination of the call leg. The report shall contain call duration and release cause. The CSE can request a report for each call leg of the CPH configuration.

## 15.4 CSE control of call duration

The purpose of this procedure is to allow the CSE to monitor and influence the call duration for each call leg independently of the other call legs in the CPH configuration. A change in the CPH configuration may result in a revision of the maximum call period duration for the altered call leg.

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

- a) Receive a maximum call period duration from the CSE for a call leg;
- b) Receive a switch time after which the next tariff switch applies for a call leg;
- c) Receive sets of e-values for the served subscriber (for the purpose of AoC controlled by the CSE).

The following combinations of the instructions are allowed:

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

In the above combinations it shall be possible for the CSE to instruct multiple values of (a) and/or (b).

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

The CSE shall be able to instruct the IPLMN/VPLMN to begin playing of an audible tone to the served subscriber at anytime before the maximum call period time is expired.

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

- The time before the maximum call period time expires when tone playing shall start;
- The number of bursts to be played (1, 2 or 3);
- The time interval between bursts (maximum 120 seconds);
- The number of tones in each burst (1, 2 or 3);
- The duration of the tone in a burst;
- The pause between the tone in a burst.

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 a call leg is answered, the IPLMN/VPLMN shall:

- Start the timer for the first call period for that leg;
- 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 first call leg 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 (that is from the time the first call leg is answered) except in the case where the tariff switch time occurs before the first call leg is answered, ~~then in which case~~ 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 leg is/was answered:
  - Report the elapsed time since the call leg was/is answered to the CSE;
- If a tariff switch has occurred since the call leg was/is answered:
  - Report the elapsed time since the last tariff switch has applied;
  - Report the elapsed time from when the call leg was/is answered, or from when the previous tariff switch occurred to the time when the most recent tariff switch occurred.

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

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

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

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

- Release the call;
- Continue the call processing.

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 for the call leg:

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

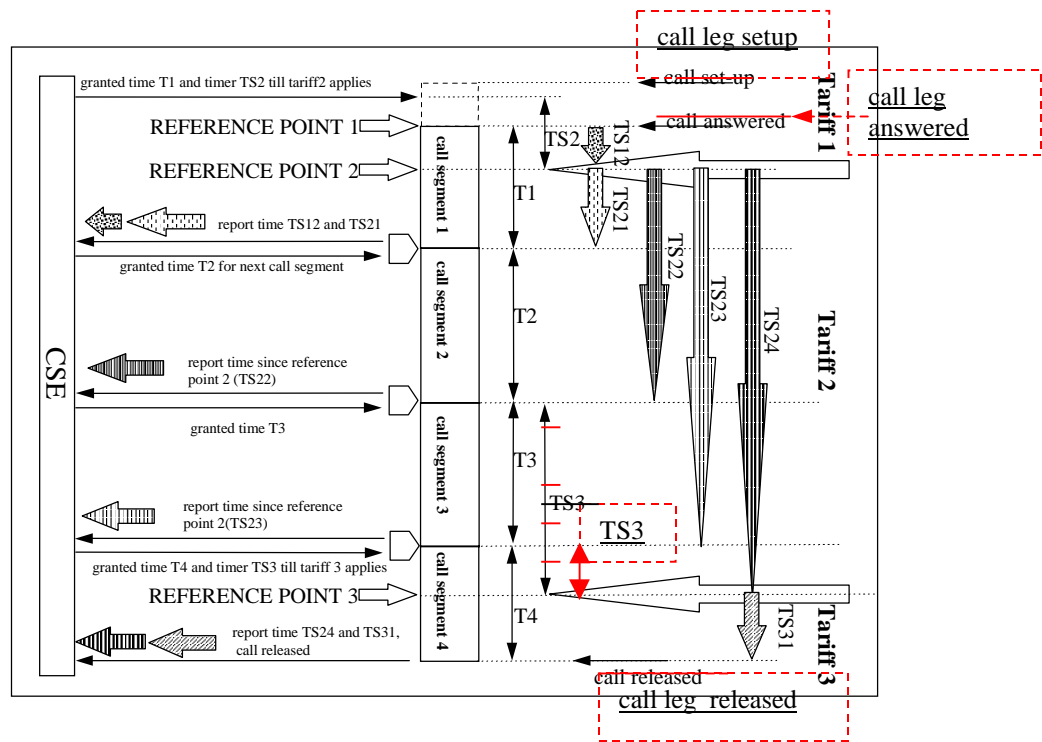
When the reference point for the tariff switch is reached, the stored set of e-values (if available) is sent immediately to the mobile station.

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

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

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

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



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

**Reference Point 1:** when the call leg is answered, tariff 1 applies

**Reference Point 2:** the point in time when tariff 2 applies

**Reference Point 3:** the point in time when tariff 3 applies

A call period is a certain time part of an ongoing call. The duration of a call period is limited by the granted time from the CSE.

Timers indicating the maximum duration (or granted time) for the call periods are called  $T_x$  ( $x$  is the number of the call period).

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

Timers indicating the elapsed time in a certain tariff are called  $TS_{xy}$  ( $x$  is the number of the tariff and  $y$  is the elapsed time since the previous reference point).

When a call period is ended, the elapsed time in each tariff is reported to the CSE.

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

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

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.

**\*\*\* End of Document \*\*\***



**3GPP TSG-SA1 CAMEL Meeting #6**  
**Dallas, USA, 26<sup>th</sup> – 28<sup>th</sup> June 2001**

**Tdoc S1C010117**  
*(Revision of Tdoc S1C010115)*

CR-Form-v4

**CHANGE REQUEST**

**22.078**    **CR**    **113**    rev **2**    Current version: **5.3.0**

**Proposed change affects:**    (U)SIM     ME/UE     Radio Access Network     Core Network

<b>Title:</b>	Introduction of definitions for CPH		
<b>Source:</b>	SA1		
<b>Work item code:</b>	CAMEL4	<b>Date:</b>	13/07/01
<b>Category:</b>	<b>F</b>	<b>Release:</b>	REL-5
	<i>Use <u>one</u> of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		<i>Use <u>one</u> of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	When Call Party Handling was introduced into 22.078, the addition of the new terms into the definitions section was overlooked.
<b>Summary of change:</b>	Introduction of the terms Call Party Handling (CPH), CPH Configuration, Call Party and Call Leg in clause 3.
<b>Consequences if not approved:</b>	Confusion over what is meant by the terms Call Party Handling (CPH, CPH Configuration, Call Party and Call Leg.

<b>Clauses affected:</b>	3	
<b>Other specs affected:</b>	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	
<b>Other comments:</b>		

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## 3 Definitions and abbreviations

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

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

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

**Route select failure:** A condition when routing to the called party fails. Route Select Failure can be reported in an existing relationship or a new relationship can be initiated.

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

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

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

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

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

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

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

The OSS may include both services provisioned for individual subscribers and services provisioned equally for all users of a VPLMN.

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

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

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

- **Geographical information** indicates the location (latitude and longitude) of the served subscriber. When Cell ID or Location Area Code is known the latitude and longitude may be calculated as the nominal central point of the cell or of the location area; alternative mechanisms for determining latitude and longitude may also be supported. The uncertainty of the indicated location is part of the geographical information.
- **Geodetic Information** provides the same functional capability as geographical information; however it is encoded differently.
- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used if the subscriber is using GSM radio access. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.
- **Routing Area ID** indicates the global identity of the current or last GPRS routing area which the subscriber is using or has used if the subscriber is using GSM radio access in a GPRS serving network.
- **Service Area ID** indicates the global identity of the current or last service area which the subscriber is using or has used if the subscriber is using UMTS radio access. The VPLMN shall update the stored Service Area ID at establishment of every radio connection and whenever the subscriber is handed over between service areas.

- **VLR number** is the number of the serving VLR stored in the HPLMN.
- **Location status** indicates whether or not the location information has been confirmed by radio contact. If the location information has not been confirmed by radio contact a time stamp is sent indicating the time elapsed since the last radio contact with the subscriber.
- **Location number** is the number received on the incoming circuit (for an incoming call) or to be sent on the outgoing circuit (for an outgoing call).

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

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

- **CAMEL-busy:** The MS is engaged in a mobile-originated or mobile-terminated circuit-switched call.
- **Network determined not reachable:** The network can determine from its internal data that the MS is not reachable. This includes detached and purged mobile stations.
- **Assumed idle:** The MS is not CAMEL-busy or network determined not reachable.

**GPRS session:** The period during which the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network.

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

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

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

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

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

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

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

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

**Call Party Handling (CPH):** A method of manipulating call legs which includes creating new parties in a call, placing individual call parties on hold, reconnecting them to the group of call parties and disconnecting individual call parties.

**CPH Configuration:** One or more groups of call legs that share a common dialogue to the CSE.

**Call Leg:** The connection joining the call party to the CPH configuration.

**Call Party:** A party (e.g. served subscriber, called party, PSTN subscriber etc.) in the CPH configuration.

\*\*\*\* End of Document \*\*\*\*

3GPP TSG-SA1 CAMEL Meeting #6  
Dallas, USA, 26<sup>th</sup> – 28<sup>th</sup> June 2001

**Tdoc S1C010119**  
(Revision of S1C010114)

CR-Form-v4

## CHANGE REQUEST

**22.078 CR 114** rev **1** Current version: **5.3.0**

**Proposed change affects:** (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	Editorial corrections to subclause 8.1		
<b>Source:</b>	SA1		
<b>Work item code:</b>	CAMEL4	<b>Date:</b>	13/07/01
<b>Category:</b>	<b>F</b>	<b>Release:</b>	REL-5
<i>Use <u>one</u> of the following categories:</i>		<i>Use <u>one</u> of the following releases:</i>	
<b>F</b> (correction)		2	(GSM Phase 2)
<b>A</b> (corresponds to a correction in an earlier release)		R96	(Release 1996)
<b>B</b> (Addition of feature),		R97	(Release 1997)
<b>C</b> (Functional modification of feature)		R98	(Release 1998)
<b>D</b> (Editorial modification)		R99	(Release 1999)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.		REL-4	(Release 4)
		REL-5	(Release 5)

<b>Reason for change:</b>	Subclause 8.1 contains some editorial errors
<b>Summary of change:</b>	Correction of editorial errors
<b>Consequences if not approved:</b>	Editorial errors in subclause 8.1

<b>Clauses affected:</b>	8.1.1, 8.1.2, 8.1.4
<b>Other specs affected:</b>	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
<b>Other comments:</b>	

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

### 8.1.1 Creating additional parties in the call

The purpose of this procedure is to allow the CSE to create additional parties in a call at any point during that call. The CSE initiated call leg shall be created in the held state in the IPLMN/VPLMN of the served subscriber.

If a control relationship exists, it shall be possible for the CSE to instruct the IPLMN/VPLMN of the served subscriber to initiate a new call leg to an additional party. The new call leg shall form part of the existing CPH configuration.

If a CSE initiated new call leg is created within a CAMEL relationship for a mobile originated call (MO case) or for a mobile terminating call in the ~~VPLMN/VMSC~~ (VT case), the CSE initiated new leg in the VPLMN shall be subject to the Outgoing Call Barring Supplementary Services and the Outgoing Operator Determined Barring categories. However the CSE shall be able to instruct the VPLMN to suppress the invocation for the new leg of conditional barring of outgoing calls by the call barring supplementary service and operator determined barring as indicated in subclause 18.8.

The CSE shall have the possibility to send the information listed in table A-2 (CSE initiated call set-up).

If the CSE sends a request to initiate a new call leg the events relating to unsuccessful call establishment and answer should be armed by the CSE to maintain a control relationship.

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

### 8.1.2 Placing an individual call party on hold

The purpose of this procedure is to allow the CSE to instruct the IPLMN/VPLMN to place an individual call party on hold.

The CSE may instruct the IPLMN/VPLMN to put a call party on hold at any point during the active phases of the call leg if a control relationship exists.

The CSE shall be able to instruct the IPLMN/VPLMN to send a notification towards the held party indicating that she has been placed on hold. The notification shall be a tone or an announcement.

NOTE: This procedure does not use the HOLD supplementary service, however the notification message sent to the MS may be the same as for the HOLD supplementary service. The CSE may use other procedures instead of, or as well as, instructing the IPLMN/VPLMN to send a tone or announcement to notify the held party that she has been placed on hold.

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

### 8.1.4 Connecting an individual call party to the group

The purpose of this procedure is to allow the CSE to instruct the IPLMN/VPLMN to connect an individual call party to the group.

The CSE may instruct the IPLMN/VPLMN to connect a held call party to the group at any point during the alerting and active phases of the call leg if a control relationship exists.

The CSE shall be able to instruct the IPLMN/VPLMN to send a notification ~~shall be sent~~ towards the previously held party indicating that ~~she~~ the call has been connected to the group. The CSE shall be able to instruct the IPLMN/VPLMN to send a notification towards the other party or parties in the group indicating that an additional party has been connected to the group. The notification shall be a tone or an announcement.

NOTE: The CSE may use other procedures instead of, or as well as, instructing the IPLMN/VPLMN to send a tone or announcement to notify the previously held party that she has been connected to the group. The same principle applies to the notification towards the other party or parties in the group.

**\*\*\*\* End of Document \*\*\*\***

3GPP TSG-SA1 CAMEL Adhoc Meeting  
 Dallas, Texas, USA, 26 - 28 June 2001

*Tdoc S1C010132*

<small>CR-Form-v3</small>
<b>CHANGE REQUEST</b>
⌘ <b>22.078 CR 115</b> ⌘ rev <b>1</b> ⌘ Current version: <b>5.3.0</b> ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘	Introduction service requirements for CAMEL interworking with the IP Multimedia subsystem	
<b>Source:</b>	⌘	SA1	
<b>Work item code:</b>	⌘	CAMEL4	<b>Date:</b> ⌘ 13/07/01
<b>Category:</b>	⌘	<b>B</b>	<b>Release:</b> ⌘ Rel-5
		Use <u>one</u> of the following categories: <b>F</b> (essential correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

<b>Reason for change:</b>	⌘	This CR introduces the requirements for CAMEL interworking with IP multimedia session in the IMS
<b>Summary of change:</b>	⌘	Introduction of new section to cover the applicability of CAMEL with in IP Multimedia Core Network.
<b>Consequences if not approved:</b>	⌘	

<b>Clauses affected:</b>	⌘	1,2,3,4.1, 4.2, 4.3 plus new section currently labelled A.
<b>Other specs affected:</b>	⌘	<input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
<b>Other comments:</b>	⌘	This CR addresses the requirements for CAMEL control over Mobile Originated and Mobile Terminated IP multimedia sessions. The applicability of CAMEL control over other features requires further study.

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# 1 Scope

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

If an IPLMN or VPLMN supports CAMEL Phase 4, it shall also provide the functionality of all previous CAMEL phases.

Phase 4 network signalling shall support interworking with CAMEL Phases 3 and 2.

The CAMEL feature is applicable

- To mobile originated and mobile terminated call related activities;
- To supplementary service invocations;
- To SMS MO, to GPRS sessions and PDP contexts, to the control of HLR subscriber data, to the control of network signalling load.

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

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

The second phase of CAMEL enhances the capabilities of phase 1 where the following capabilities have been added:

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

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

- Support of facilities to avoid overload;
- Capabilities to support Dialed Services;
- Capabilities to handle mobility events, such as (Not-)reachability and roaming;
- Control of GPRS sessions and PDP contexts;
- Control of mobile originating SMS through both circuit switched and packet switched serving network entities.
- Interworking with SoLSA. (Support of Localised Service Area). Support for this interworking is optional.
- The CSE can be informed about the invocation of the GSM supplementary services CCBS.

Detailed information is given in the respective sections.

The fourth phase of CAMEL enhances the capabilities of phase 3. The following capabilities are added:

- CAMEL support for Optimal Routing of circuit-switched mobile-to-mobile calls;
- The capability for the CSE to create additional parties in an existing call;
- The capability for the CSE to create a new call unrelated to any other existing call;
- Capabilities for the enhanced handling of call party connections;
- Enhanced CSE capability for Subscribed Dialed Services.
- [The capability for the CSE to control sessions in the IP Multimedia Subsystem.](#)

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## 2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 22.093: "Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".
- [2] 3GPP TS 22.079: "Support of Optimal Routing (SOR); Service definition (Stage 1)".
- [3] 3GPP TS 22.030: "Man-machine Interface (MMI) of the Mobile Station (MS) (Stage 1)".
- [4] 3GPP TS 22.090: "Stage 1 Decision of Unstructured Supplementary Service Data (USSD)".
- [5] 3GPP TS 22.097: "Multiple Subscriber Profile (MSP); Service definition (Stage 1)".
- [6] 3GPP TS 22.060: "General Packed Radio Service (GPRS); Service definition (Stage 1)".
- [7] 3GPP TS 22.057: "Mobile Environment (MExE); Service definition (Stage 1)".
- [8] 3GPP TS 22.071: "Location Services; Service Definition (Stage1) ".
- [9] 3GPP TS 23.018: "Basic Call Handling; Technical Realization".
- [10] 3GPP TS 22.003: "Circuit teleservices supported by a public land mobile network (PLMN)".
- [11] [3GPP TS 22.228: "Service Requirements for IP multimedia Core Network; \(Stage1\)".](#)

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## 3 Definitions and abbreviations

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



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

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

**Route select failure:** A condition when routing to the called party fails. Route Select Failure can be reported in an existing relationship or a new relationship can be initiated.

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

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

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

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

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

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

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

The OSS may include both services provisioned for individual subscribers and services provisioned equally for all users of a VPLMN.

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

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

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

- **Geographical information** indicates the location (latitude and longitude) of the served subscriber. When Cell ID or Location Area Code is known the latitude and longitude may be calculated as the nominal central point of the cell or of the location area; alternative mechanisms for determining latitude and longitude may also be supported. The uncertainty of the indicated location is part of the geographical information.
- **Geodetic Information** provides the same functional capability as geographical information; however it is encoded differently.
- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used if the subscriber is using GSM radio access. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.
- **Routing Area ID** indicates the global identity of the current or last GPRS routing area which the subscriber is using or has used if the subscriber is using GSM radio access in a GPRS serving network.
- **Service Area ID** indicates the global identity of the current or last service area which the subscriber is using or has used if the subscriber is using UMTS radio access. The VPLMN shall update the stored Service Area ID at establishment of every radio connection and whenever the subscriber is handed over between service areas.
- **VLR number** is the number of the serving VLR stored in the HPLMN.
- **Location status** indicates whether or not the location information has been confirmed by radio contact. If the location information has not been confirmed by radio contact a time stamp is sent indicating the time elapsed since the last radio contact with the subscriber.

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

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

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

- **CAMEL-busy:** The MS is engaged in a mobile-originated or mobile-terminated circuit-switched call.
- **Network determined not reachable:** The network can determine from its internal data that the MS is not reachable. This includes detached and purged mobile stations.
- **Assumed idle:** The MS is not CAMEL-busy or network determined not reachable.

**GPRS session:** The period during which the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network.

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

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

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

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

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

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

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

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

[IP multimedia session \(IPMM session\) : See \[11\] for definition.](#)

[IM CN subsystem \(IP Multimedia Core Network subsystem\): See \[11\] for definition.](#)

## 4 Description

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

### 4.1 Provision of CAMEL

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

The following CSIs may be administered per subscriber:

<b>D-CSI</b>	<i>Dialled Services CAMEL Subscription Information (D-CSI)</i> is transferred to the VPLMN (at location update) <del>and</del> <a href="#">-IPLMN</a> (for an incoming call in GMSC) <a href="#">or the IM CN subsystem</a> . D-CSI contains trigger information which is required to invoke a CAMEL service logic for subscribers dialled services. See section 5.3.2 <a href="#">and section A.2.2</a> for the usage of D-CSI.
<b>GPRS-CSI</b>	<i>GPRS CAMEL Subscription Information (GPRS-CSI)</i> is transferred to the VPLMN. GPRS-CSI contains trigger information which is required to invoke a CAMEL Service Logic for GPRS Sessions and PDP Contexts. See section 10 for the usage of GPRS-CSI.
<b>M-CSI</b>	<i>Mobility Management CAMEL Subscription Information (M-CSI)</i> is transferred to the VPLMN. M-CSI is used to notify the CSE about Mobility Management events for the CS subscriber. See section 12.1 for the usage of M-CSI.
<b>MG-CSI</b>	<i>Mobility Management for GPRS CAMEL Subscription Information (MG-CSI)</i> is transferred to the VPLMN. MG-CSI is used to notify the CSE about Mobility Management events for the GPRS subscriber. See section 12.1 for the usage of MG-CSI.
<b>MO-SMS-CSI</b>	<i>Originating Short Message Service CAMEL Subscription Information (MO-SMS-CSI)</i> is transferred to the VPLMN. MO-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 MO-SMS-CSI.
<b>MT-SMS-CSI</b>	\$(CAMEL4\$) <i>Terminating Short Message Service CAMEL Subscription Information (MT-SMS-CSI)</i> is transferred to the VPLMN. MT-SMS-CSI contains trigger information that is required to invoke a CAMEL Service Logic for Mobile Terminating Short Message delivery. See section 9 for the usage of MT-SMS-CSI.
<b>O-CSI</b>	<i>Originating CAMEL Subscription Information (O-CSI)</i> is transferred to the VPLMN (at location update) <del>and</del> to the IPLMN (for an incoming call in the GMSC) <a href="#">and to the IM CN subsystem</a> . O-CSI contains trigger information that is required to invoke a CAMEL Service Logic for Mobile Originating calls (in the VMSC) and Mobile Forwarding calls (in the VMSC and the GMSC). See sections <a href="#">5</a> <a href="#">and A</a> for the usage of O-CSI.
<b>SS-CSI</b>	<i>Supplementary Service Invocation Notification CAMEL Subscription Information (SS-CSI)</i> 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.
<b>T-CSI</b>	<i>Terminating CAMEL Subscription Information (T-CSI)</i> is transferred to the IPLMN for an incoming call in the GMSC. T-CSI contains trigger information which is required to invoke a CAMEL Service Logic for Mobile Terminating calls in the GMSC. See section 6 for the usage of T-CSI.
<b>TIF-CSI</b>	<i>Translation information Flag CAMEL Subscription Information (TIF-CSI)</i> is transferred to the VPLMN. TIF-CSI is used in the HLR for registering short Forwarded-to-Numbers (FTNs). When TIF-CSI is present, the subscriber is allowed to register short FTNs. When the subscriber invokes Call Deflection, TIF-CSI in the VPLMN allows the subscriber to deflect to short Deflected-to-Numbers. See section 18.3 for the usage of TIF-CSI.
<b>U-CSI</b>	<i>USSD CAMEL Subscription Information (U-CSI)</i> is held in the HLR; it is not sent to any other node. U-CSI contains trigger information which is used to invoke a USSD application in the CSE for the served subscriber. See section 14.3 for the usage of U-CSI.
<b>UG-CSI</b>	<i>USSD General CAMEL Subscription Information (UG-CSI)</i> is held in the HLR; it is not sent to any other node. UG-CSI contains trigger information which is used to invoke a USSD application in the CSE for all subscribers. See section 14.3 for the usage of UG-CSI.

**VT-CSI** VMSC *Terminating CAMEL Subscription Information (VT-CSI)* is transferred to the VPLMN at location update [and to the IM CN subsystem](#). VT-CSI contains trigger information which is required to invoke a CAMEL Service Logic for Mobile Terminating calls in the VMSC. See sections [6](#) and [A](#) for the usage of VT-CSI.

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

The CSI may include the Default Call Handling, Default GPRS Handling or Default SMS Handling.

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

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

## 4.2 General Procedures

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

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

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

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

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

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

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

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

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

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

If a control relationship exists between the CSE and the IPLMN/VPLMN of the served subscriber, then at any time during the the call the CSE can instruct the IPLMN/VPLMN of the served subscriber to perform one or more of the following Call Party Handling operations:

- Create additional parties in the call (additional parties shall be created in a held state);
- Release an individual call party ;
- Release all parties in the call.

If a control relationship exists between the CSE and the IPLMN/VPLMN of the served subscriber, then at any time during the alerting and active phases of a call leg, the CSE can instruct the IPLMN/VPLMN of the served subscriber to perform the following Call Party Handling operation:

- Connect an individual call party to the group of call parties, within the same call (the call party shall be in a held state immediately before this operation).

If a control relationship exists between the CSE and the IPLMN/VPLMN of the served subscriber, then at any time during the active phase of a call leg, the CSE can instruct the IPLMN/VPLMN of the served subscriber to perform the following Call Party Handling operation:

- Place an individual call party on hold (the call party shall not be in a held state immediately before this operation).

NOTE: Call Party Handling operations are not applicable to a call leg or group of legs which are involved in user interaction (Play Announcement or Prompt and Collect User Information)

It shall be possible for the CSE to initiate a new call to the HPLMN/VPLMN of a subscriber at any time.

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

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

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

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

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

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

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

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

- Mobile Originated call (MO call);
- Mobile Terminated call (MT call) in GMSC;
- Mobile Terminated call (MT call) in VMSC;
- 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;
- [Mobile Originated IP Multimedia Session in Serving CSCF.](#)
- [Mobile Terminated IP Multimedia Session in Serving CSCF.](#)
- Supplementary service invocation;
- USSD user interaction. The service codes for CAMEL services can be allocated per subscriber or globally for all subscribers of the HPLMN;
- Mobile Originated Short Message (MO SM) service; via both the MSC and the SGSN;
- Mobile Terminating Short Message (MT SM) service; via both the MSC and the SGSN - \$(CAMEL4\$);
- General Packet Radio Service (GPRS);
- Mobility Management events;
- Interrogation and control of Subscription Data.

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

### 4.3 Applicability of CAMEL Procedures

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

CAMEL procedures are applicable to GPRS sessions and PDP contexts.

CAMEL procedures are applicable to the Mobile Originating/ Terminating \$(CAMEL4\$) Short Message Service through both circuit switched and packet switched serving network entities.

<p><b>**** Next modified section ****</b></p>
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## A Procedures for IP multimedia sessions

### A.1 General

When a user registers with the IM CN subsystem, sufficient information shall be provided to detect mobile originating or mobile terminating IPMM sessions in the IM CN subsystem. When a mobile originated or mobile terminated IPMM session is detected by the IM CN subsystem, the IM CN subsystem shall decide whether the CSE shall be contacted. If the CSE is contacted the IM CN subsystem shall provide information which includes information taken from the IPMM session and information previously stored in the IM CN subsystem. When the IM CN subsystem contacts the CSE, the IM CN subsystem shall suspend the handling of the IPMM session and make contact with a CSE to ask for instructions.

The IM CN subsystem shall accept the instructions from the CSE and continue IPMM session processing with the received information.

## A.2 Mobile Originated Events

### A.2.1 Initial contact with the CSE

When the IM CN subsystem initiates contact with the CSE, the IPMM session processing is suspended and the IM CN subsystem waits for instructions from the CSE. It shall be possible to specify which of the following initial events shall initiate contact with the CSE:

- Called identity received at the IM CN subsystem,
- Analysis of called identity
- Unsuccessful IPMM session setup.

For mobile originated IPMM sessions, the information listed in table Y.1 shall be provided to the CSE [Note: table Y.1 yet to be provided and shall be based on the same principle as table A.1]. After initial contact with the CSE, the CSE shall provide the IM CN subsystem with further instructions as detailed in table X.1.

### A.2.2 Criteria for initial contact with the CSE

#### A.2.2.1 CSI criteria applicable at IPMM session setup when called identity is received

CSI criteria may be defined for a subscriber for the case when the called identity is received at IPMM session setup .

- Criteria on the called identity; these consist of:
  - The contents of the identity (a list of up to 10 identities may be defined in the criteria)
- The criteria on the called identity 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 called identity.
- [FFS] Media type

#### A.2.2.2 CSI criteria applicable at IPMM session setup after analysis of called identity

A CSI criterion on the contents of the called identity shall be defined for subscribed dialled services. A list of up to 10 called identities may be defined in the criterion. Each entry in the called identity 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 identity shall be used for the conditional triggering check.

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

#### A.2.2.3 CSI criterion applicable on detection of unsuccessful IPMM session establishment

A criterion on the release cause may be defined. This may consist 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.

## A.2.3 Subsequent events reported to the CSE

After initial contact with the CSE as detailed in sub clause A.2.1, the CSE may request the IM CN subsystem to detect and report subsequent events. These events are listed below. With each of these events, the CSE shall indicate the type of monitoring (ie suspension of IPMM session processing or notification). If the CSE requests the suspension of IPMM session processing, it shall provide the IM CN subsystem with further instructions as detailed in table X.1. For mobile originated IPMM sessions, the information listed in table Y.1 shall be provided to the CSE [Note: table Y.1 yet to be provided and shall be based on the same principle as table A.1]

The subsequent events that may be detected by the IM CN subsystem and reported to the CSE are:

- The called party answers;
- Additional information received from the originating party;
- The IPMM session is disconnected;
- The originating party abandons the IPMM session;
- Unsuccessful IPMM session setup. The following events shall be possible:
  - The called party is busy;
  - The called party does not respond in specified time period;
  - The called party can not be reached.

## A.2.43 Instruction by the CSE

After initial contact with the CSE, or after the reporting of subsequent events to the CSE, the CSE shall be able to instruct the IM CN subsystem with the following:

- To bar the IPMM session;
- To arm one or more subsequent events;
- To perform the charging activity;
- To perform the in-band user interaction;
- To continue the IPMM session;
- To continue the IPMM session with modified information;
- To release the IPMM session.

The combination of the event reported to the CSE and the instruction by the CSE is provided in the table X.1. For mobile originated IPMM sessions, the information listed in table Y.2 shall be provided by the CSE [Note: table Y.2 yet to be provided and shall be based on the same principle as table A.2]

Table X.1 Actions performed by the CSE at specific service event for MO and MT IP multimedia session can be found in Annex AA

## A.3 Mobile Terminated Events

### A.3.1 Initial contact with the CSE

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

- Incoming IPMM session to subscriber;



- Detection of unsuccessful IPMM session establishment.

Unsuccessful IPMM session establishment may be caused by:

- Called subscriber busy;
- Called subscriber not reachable;
- No answer from called subscriber in specified time period.

When the IM CN subsystem initiates contact with the CSE, the IPMM session processing is suspended and the IM CN subsystem waits for instructions from the CSE. For mobile terminated IPMM sessions, the information listed in table Y.1 shall be provided to the CSE [Note: table Y.1 yet to be provided and shall be based on the same principle as table A.1]. After initial contact with the CSE, the CSE shall provide the IM CN subsystem with further instructions as detailed in table X.1.

## A.3.2 Criteria for initial contact with the CSE

### A.3.2.1 CSI criteria applicable on detection incoming IPMM session

CSI criteria may be defined for a subscriber for the case when an incoming IPMM session request is detected .

- [FFS] Media type

### A.3.2.2 CSI criteria applicable on detection of unsuccessful IPMM session establishment

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 an error response 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 IPMM session corresponds to any failure reason defined in the list or if no criterion is defined.

## A.3.3 Subsequent events reported to the CSE

After initial contact with the CSE as detailed in sub clause A.3.1, the CSE may request the IM CN subsystem to detect and report subsequent events. These events are listed below. With each of these events, the CSE shall indicate the type of monitoring (ie suspension of IPMM session processing or notification). If the CSE requests the suspension of IPMM session processing, it shall provide the IM CN subsystem with further instructions as detailed in table X.1. For mobile terminated IPMM sessions, the information listed in table Y.1 shall be provided to the CSE [Note: table Y.1 yet to be provided and shall be based on the same principle as table A.1].

The subsequent events that may be detected by the IM CN subsystem and reported to the CSE are:

- The called party is alerted
- The called party answers;
- Additional information received from the terminating party;
- The IPMM session is disconnected;
- The calling party abandons;
- Unsuccessful IPMM session setup. The following events shall be possible:
  - The called party does not respond in specified time period.

## A.3.4 Instruction by the CSE

After initial contact with the CSE, or after the reporting of subsequent events to the CSE, the CSE shall be able to instruct the IM CN subsystem with the following:

- To bar the IPMM session;
- To arm one or more subsequent events;
- To perform the charging activity;
- To perform the in-band user interaction;
- To continue the IPMM session;
- To continue the IPMM session with modified information;
- To release the IPMM session;
- To suppress tones and announcements which may be played to the calling party, if an unsuccessful IPMM session establishment occurs

The combination of the event reported to the CSE and the instruction by the CSE is provided in the table X.1. For mobile terminated IPMM sessions, the information listed in table Y.2 shall be provided by the CSE [Note: table Y.2 yet to be provided and shall be based on the same principle as table A.2]

Table X.1 Actions performed by the CSE at specific service event for MO and MT IP multimedia session can be found in Annex AA



<a href="#">session</a>																	
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[Table X-1: Actions performed by the CSE at specific service event for MO and MT IP multimedia session](#)

**\*\*\* End of Document \*\*\***

3GPP TSG-SA1 CAMEL Ad Hoc  
 Dallas, USA, 26 – 28 June 2001

Tdoc S1C010133

CR-Form-v4	
<b>CHANGE REQUEST</b>	
⌘ <b>22.078 CR 116</b> ⌘	ev <b>-</b> ⌘ Current version: <b>5.3.0</b> ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Additional procedure description to Charging Notification		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13/07/01
<b>Category:</b>	⌘ <b>C</b>	<b>Release:</b>	⌘ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		<b>2</b> (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)		<b>R96</b> (Release 1996)
	<b>B</b> (addition of feature),		<b>R97</b> (Release 1997)
	<b>C</b> (functional modification of feature)		<b>R98</b> (Release 1998)
	<b>D</b> (editorial modification)		<b>R99</b> (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		<b>REL-4</b> (Release 4)
			<b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ With the notification of charging information the CSE will be informed about charging relevant data, received in the MSC. If the CSE is supervising the call duration, it may be needed to be revised due to the newly-obtained charging relevant data. This feature is essential particularly in the case of Prepaid Service.
<b>Summary of change:</b>	⌘ Add the texts on providing the elapsed time.
<b>Consequences if not approved:</b>	⌘ The CSE is not able to revise the call duration based on the new information.

<b>Clauses affected:</b>	⌘ 5.10, 6.11
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/>
	<input type="checkbox"/> Test specifications
	<input type="checkbox"/> O&M Specifications
<b>Other comments:</b>	<input type="text"/>

\*\*\* First modified section \*\*\*

## 5.10 Charging Notification procedure \$(CAMEL4\$)

When charging information becomes available in the MSC, it shall be reported to the CSE.

Charging information shall be reported to the CSE only if this was requested by that CSE.

The type of charging information reported to the CSE shall be as requested by the CSE.

When charging information is sent to the CSE, providing that the CSE control of the duration is active, the CSE shall be able to revise the call duration.

\*\*\* Next modified section \*\*\*

## 6.11 Charging Notification procedure

When charging information becomes available in the MSC, it shall be reported to the CSE. Charging information shall be reported to the CSE only if this was requested by that CSE.

The type of charging information reported to the CSE shall be as requested by the CSE.

When charging information is sent to the CSE, providing that the CSE control of the duration is active, the CSE shall be able to revise the call duration.

3GPP TSG-SA1 CAMEL Ad Hoc  
 Dallas, USA, 26 – 28 June 2001

Tdoc S1C010130

CR-Form-v4	
<b>CHANGE REQUEST</b>	
⌘ <b>22.078 CR 118</b> ⌘ ev <b>-</b> ⌘ Current version: <b>5.3.0</b> ⌘	

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Additional information for called party connection procedures		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13/07/01
<b>Category:</b>	⌘ <b>C</b> Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	<b>Release:</b>	⌘ Rel-5 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

<b>Reason for change:</b>	⌘ In the MSC a charge indicator (part of the parameter Backward Call Indicator) may be received via one (or more) of the following ISUP messages: (CON, ACM, CPG and/or ANM). The MSC may write a charge indicator in the Call Data Record. For this purpose the MSC evaluates the received charge indicator and write the result into the Call Data Record (either directly like received via ISUP or changed by MSC itself). However, the CSE does not know the charge indicator stored in the Call Data Record within the MSC. For Prepaid subscribers this charging information is essential for the CSE, hence a notification shall be sent in every case to the CSE (independent, whether requested by CSE or not). This enables the CSE to perform the proper actions, e.g. in case of Prepaid subscribers.  See also in other comments column.
<b>Summary of change:</b>	⌘ Add the charging indicator to the information to be provided to the CSE
<b>Consequences if not approved:</b>	⌘ The CSE will not obtain the changed charging information and is not able to react on changed information

<b>Clauses affected:</b>	⌘ 5.6, 6.6
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications

**Other comments:**

If the ISUP:ANM has been received, it may be assumed, that the charge indicator was received in the MSC (within ANM or at least one of the preceding ISUP messages). The charge indicator shall be notified to the CSE with the ERB (DP Answer) message. (RRB for this DP preassumed). The CSE may consider the new information and take the proper actions.

With this opportunity a Prepaid service then could be optimised by sending Apply Charging (AC) not before receiving the ERB Answer. Then the CSE would be able to consider the notified charge indicator in the AC message. Furthermore the CSE could react on charging indications, different from the supposed handling, with requesting further charging info via Request Notification Charging (RNC) message.

Example 1: A mobile subscriber is calling a PSTN number, which is no more valid. The PSTN operator plays a charge free announcement: ("number has changed. please call new number xxx"). Before starting the announcement an ISUP: Answer message is sent to the MSC, containing a charge free indication. The Prepaid Service assumes normal charging and the charging timer starts when Answer has been received in the MSC. If the PLMN operator accepts the charge free indication for this announcement and doesn't want to charge the call, the CSE shall be notified about the free of charge handling.

Example 2: If a mobile subscriber, who is roaming abroad, is calling a "free of charge" service number within the country he is roaming in, this will be indicated via ISUP (charge indicator) to the serving MSC. Then the CSE shall be notified by the MSC with the charge free indication. With this handling charge free services from foreign countries are available when roaming abroad. There is no need for the CSE for administration of these charge free numbers.

Example 3: The acceptance of charging information is network specific and most operators will not accept charge indicators sent across network borders. However, one can imagine that different operators (may be several subsidiary companies) have special agreements to accept the charge indicator between the borders of their PLMN's (ISUP parameter: Backward Call Indicator)

In this case it is possible for the subscribers to call from their HPLMN to charge free targets in those foreign networks (with this special agreement). The serving MSC receives the charge indicator and puts it into the Call Data Record. After receiving of ISUP:Answer the MSC notifies the CSE via ERB (Answer) of the charge indicator. and the CSE is able to consider this information in the charging procedure. In this example it is possible to offer foreign charge free services (from selected networks) to the own subscribers without the need for the CSE to administrate all these charge free numbers.

The described charge indicator handling is similar to the handling of changed Destination Address (e.g. Number Portability). This is also contained in ISUP: Answer and will be reported in ERB (Answer) to the CSE.



## 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);
- The charge indicator which will be used in the Call Data Record if available;
- Type of monitoring.

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

- Perform charging activities;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - Call disconnection;
    - Mid call event (DTMF or out of band information). The out-band information may be detected during alerting phase. The detection of the mid call event shall be limited to VPLMN only).
  - The party in the call for which the event shall be detected and reported (calling or called party);
  - The type of monitoring (control or notification).
- Order in-band user interaction.

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

- Release the call;
- Continue the call processing.

\*\*\* Next modified section \*\*\*

## 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);
- The charge indicator which will be used in the Call Data Record if available;
- 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;
- Activate subsequent control service events for the call. The CSE shall have the possibility to send the following information:
  - The subsequent service event which shall be detected and reported:
    - (Call disconnection);
    - Mid call event (DTMF or out of band information). Detection of the mid call event shall be limited to the VPLMN. Out-band information may be detected during alerting phase of the call.).
  - The party in the call for which the event shall be detected and reported (calling or called party);
  - The type of monitoring (control or notification).
- Order in-band user interaction;

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

- Release the call;
- Continue the call processing;

## CHANGE REQUEST

⌘ **22.078** **CR 119** ⌘ rev **2** ⌘ Current version: **5.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘	Tones support for Camel Phase 4		
<b>Source:</b>	⌘	SA1		
<b>Work item code:</b>	⌘	CAMEL4	<b>Date:</b>	⌘ 13.07.2001
<b>Category:</b>	⌘	<b>B</b>	<b>Release:</b>	⌘ Rel-5
		<i>Use one of the following categories:</i> <b>F</b> (essential correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘	When pre-paid subscribers become low on credit, it is normal to play a warning tone.  When m-commerce and/or concurrent charging activities are supported, the only way that an SCP can currently play warning tones to a roaming subscriber is by routing the call back to the home network. This is unacceptable on cost grounds.		
<b>Summary of change:</b>	⌘	This CR is a revision of CR S1-709.  It shall be possible to play tones efficiently using local tone generators.		
<b>Consequences if not approved:</b>	⌘	When m-commerce and/or concurrent charging activities are supported, warning tones will not be played to roaming subscribers.		

<b>Clauses affected:</b>	⌘	14.1 of 22.078		
<b>Other specs affected:</b>	⌘	<input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	23.078
<b>Other comments:</b>	⌘	This CR does not require standardised tones and frequencies.		

### How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: [http://www.3gpp.org/3G\\_Specs/CRs.htm](http://www.3gpp.org/3G_Specs/CRs.htm). Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Modification of Section 14.1
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## 14 Subscriber interactions with the CSE

### 14.1 Announcement and tones insertion

As a part of the following procedures, it shall be possible for the CSE to order the playing of announcements or tones to the calling subscriber:

- The call set-up request procedure;
- The unsuccessful call establishment procedure;
- The call disconnection procedure;
- The incoming call request procedure;
- The called party alert reporting procedure.

In the active phase of the call leg and in the mid-call procedure it shall be possible for the CSE to play tones and/or announcements to any held party or the group as specified in clauses 5, 6 and 8. It shall be possible to play tones efficiently using local tone generators.

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

CR-Form-v3

## CHANGE REQUEST

⌘ **22.078 CR 120** ⌘ rev **-** ⌘ Current version: **5.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction of online charging procedures in case of CPH		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13 July 2001
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-5
Use <u>one</u> of the following categories: <b>F</b> (essential correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)	

<b>Reason for change:</b>	⌘ Changes to CAMEL charging procedures does not completely take CPH procedures into account. Charging reports to the CSE will always consider the elapsed time since a call leg was answered. CPH allows to put already answered party on hold and may re-connect them later. Calculation from the point where a call leg is answered is not precise enough and may distort the calculation. This CR takes the skill of CPH procedures fully into account.
<b>Summary of change:</b>	⌘ Charging Reports from the network to the CSE shall take into account previous CPH procedures.
<b>Consequences if not approved:</b>	⌘ The charging procedures of CAMEL are distort in the sense that calculation is always done from the beginning of a call leg instead of doing it from the point where CPH modifies the call.

<b>Clauses affected:</b>	⌘ 15.4		
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications	⌘	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
<b>Other comments:</b>	⌘ CR22.078 no 112 rev 2 (given in Tdoc S1-010782) is somehow linked. Changes done in CR 22.078 no 112 rev 2 is a good starting point but not complete. This CR completes the needed changes.		

**\*\*\* First modified section \*\*\***

## 15.4 CSE control of call duration

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

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

- a) Receive a maximum call period duration from the CSE;
- b) Receive a switch time after which the next tariff switch applies;
- c) Receive sets of e-values (for the purpose of AoC controlled by the CSE).

The following combinations of the instructions are allowed:

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

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

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

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

- The time before the maximum call period time expires when tone playing shall start;
- The number of bursts to be played (1, 2 or 3);
- The time interval between bursts (maximum 120 seconds);
- The number of tones in each burst (1, 2 or 3);
- The duration of the tone in a burst;
- The pause between the tone in a burst.

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 or since the call was modified by a CPH procedure:
  - Report the elapsed time since the call is answered or modified by a CPH procedure to the CSE;
- If a tariff switch has occurred since the call is answered or since the call was modified by a CPH procedure:
  - Report the elapsed time since the last tariff switch has applied;
  - Report the elapsed time from when the call is answered or modified by a CPH procedure; or from when the previous tariff switch occurred to the time when the most recent tariff switch occurred.

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

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

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

- Release the call;
- Continue the call processing.

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.

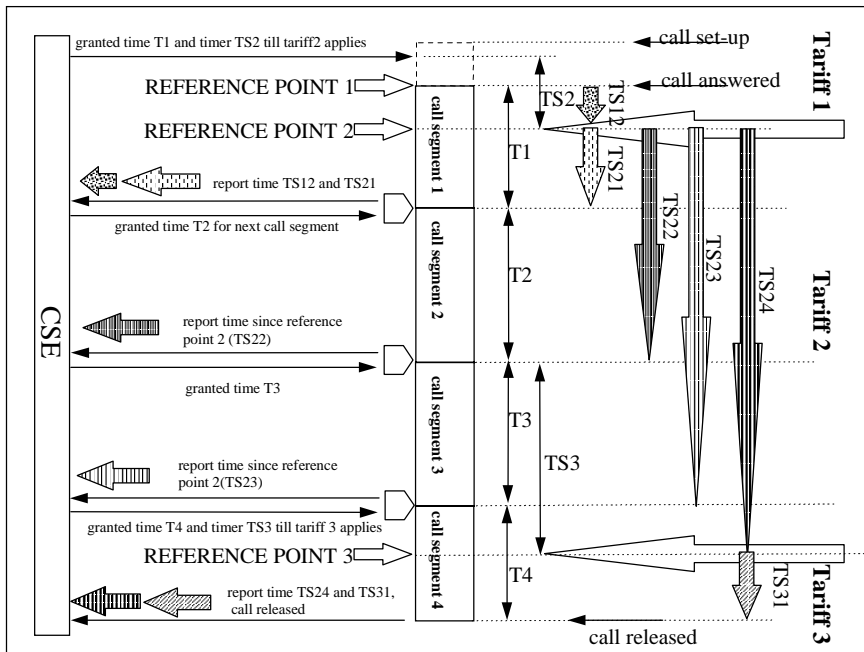
When the reference point for the tariff switch is reached, the stored set of e-values (if available) is sent immediately to the mobile station.

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

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

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

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



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

**Reference Point 1:** when the call is answered, tariff 1 applies

**Reference Point 2:** the point in time when tariff 2 applies

**Reference Point 3:** the point in time when tariff 3 applies

A call period is a certain time part of an ongoing call. The duration of a call period is limited by the granted time from the CSE.

Timers indicating the maximum duration (or granted time) for the call periods are called Tx (x is the number of the call period).

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

Timers indicating the elapsed time in a certain tariff are called TSxy (x is the number of the tariff and y is the elapsed time since the previous reference point).

When a call period is ended, the elapsed time in each tariff is reported to the CSE.

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

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

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

**\*\*\* End of Document \*\*\***



## CHANGE REQUEST

⌘ **22.078 CR 121** ⌘ rev **1** ⌘ Current version: **5.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Applicability of CAMEL to IMS		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13 July 2001
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ Rel-5
Use <u>one</u> of the following categories: <b>F</b> (essential correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)	

<b>Reason for change:</b>	⌘ This CR introduces the requirements for CAMEL interworking with IP multimedia session in the IMS
<b>Summary of change:</b>	⌘ Clarify the applicability of CAMEL with in IP Multimedia Core Network.
<b>Consequences if not approved:</b>	⌘ Support of CAMEL for IMS remains unclear

<b>Clauses affected:</b>	⌘ 4.3	
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘
<b>Other comments:</b>	⌘ This CR addresses the applicability of CAMEL for Mobile Originated and Mobile Terminated IP multimedia sessions.	

**\*\*\*\* begin modified section \*\*\*\***

### 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.

CAMEL procedures are applicable to the Mobile Originating/ Terminating \$(CAMEL4\$) Short Message Service through both circuit switched and packet switched serving network entities.

CAMEL procedures are applicable to IP multimedia sessions (except Emergency Calls) to support legacy services.

CAMEL shall support IPMM sessions which are based on the same charging paradigms as CS/PS calls. This applies most probably to VoIP and Video over IP. New charging paradigms - and this includes especially the flexible content-based charging - are to be supported by the new charging functions defined for the IM domain.

**\*\*\*\* end modified section \*\*\*\***

CR-Form-v4	
<b>CHANGE REQUEST</b>	
⌘ <b>22.078 CR 122</b> ⌘ ev <b>1</b> ⌘	Current version: <b>5.3.0</b> ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Applicability of CAMEL to IP Multimedia Sessions		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13 July 2001
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		2 (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)		R96 (Release 1996)
	<b>B</b> (addition of feature),		R97 (Release 1997)
	<b>C</b> (functional modification of feature)		R98 (Release 1998)
	<b>D</b> (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		REL-4 (Release 4)
			REL-5 (Release 5)

<b>Reason for change:</b>	⌘ Identify scope of use of CAMEL for IP Multimedia Sessions		
<b>Summary of change:</b>	⌘ CAMEL procedures are applicable to IP multimedia sessions addressed by either E.164 numbers or SIP URLs.		
<b>Consequences if not approved:</b>	⌘ Scope of CAMEL for IP Multimedia sessions will be unspecified.		

<b>Clauses affected:</b>	⌘ 4.3		
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications	⌘	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
<b>Other comments:</b>	⌘		

**How to create CRs using this form:**

Comprehensive information and tips about how to create CRs can be found at: [http://www.3gpp.org/3G\\_Specs/CRs.htm](http://www.3gpp.org/3G_Specs/CRs.htm). Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/>. For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

## 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.

CAMEL procedures are applicable to the Mobile Originating/ Terminating \$(CAMEL4\$) Short Message Service through both circuit switched and packet switched serving network entities.

[CAMEL procedures are applicable to IP multimedia sessions addressed by either E.164 numbers or SIP URLs.](#)

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

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

## 5.2 Criteria for contact with the CSE

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

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

- Criteria on the dialled number; these consist of:
  - The contents of the dialled number (a list of up to 10 dialled number strings may be defined in the criteria. Each dialled number string may be of any type of number (TON) format supported by the access protocol).
  - The length of the dialled number (a list of up to three lengths may be defined.).
- The criteria on the dialled number may be collectively defined to be either "enabling" triggering criteria or "inhibiting" triggering criteria (see below). The HPLMN may also choose not to define any criteria on the dialled number.

CR-Form-v3	
<b>CHANGE REQUEST</b>	
⌘ <b>22.078 CR</b> <b>123</b> ⌘ rev <b>-</b> ⌘ Current version: <b>5.3.0</b> ⌘	

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ CAMEL and IMS, IM application level registration		
<b>Source:</b>	⌘ SA1		
<b>Work item code:</b>	⌘ CAMEL4	<b>Date:</b>	⌘ 13 July 2001
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ Rel-5
	Use <u>one</u> of the following categories: <b>F</b> (essential correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (Addition of feature), <b>C</b> (Functional modification of feature) <b>D</b> (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

<b>Reason for change:</b>	⌘ This CR introduces the requirements for CAMEL IMS procedure when a user registers with the IM CN subsystem on application level
<b>Summary of change:</b>	⌘ Introduction of new section to cover the IM application level registration
<b>Consequences if not approved:</b>	⌘ not a category F CR

<b>Clauses affected:</b>	⌘ 2,3, A.1.5	
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘
<b>Other comments:</b>	⌘	

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## 2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 22.093: "Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".
- [2] 3GPP TS 22.079: "Support of Optimal Routeing (SOR); Service definition (Stage 1)".
- [3] 3GPP TS 22.030: "Man-machine Interface (MMI) of the Mobile Station (MS) (Stage 1)".
- [4] 3GPP TS 22.090: "Stage 1 Decision of Unstructured Supplementary Service Data (USSD)".
- [5] 3GPP TS 22.097: "Multiple Subscriber Profile (MSP); Service definition (Stage 1)".
- [6] 3GPP TS 22.060: "General Packed Radio Service (GPRS); Service definition (Stage 1)".
- [7] 3GPP TS 22.057: "Mobile Environment (MExE); Service definition (Stage 1)".
- [8] 3GPP TS 22.071: "Location Services; Service Definition (Stage 1)".
- [9] 3GPP TS 23.018: "Basic Call Handling; Technical Realization".
- [10] 3GPP TS 22.003: "Circuit teleservices supported by a public land mobile network (PLMN)".
- [11] 3GPP TS 22.228: "Service Requirements for IP multimedia Core Network; (Stage1)".

[12] [3GPP TS 23.228: "IP Multimedia \(IM\) Subsystem - Stage 2"](#)

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## 3 Definitions and abbreviations

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

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

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

**Route select failure:** A condition when routeing to the called party fails. Route Select Failure can be reported in an existing relationship or a new relationship can be initiated.

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

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

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

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

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

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

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

The OSS may include both services provisioned for individual subscribers and services provisioned equally for all users of a VPLMN.

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

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

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

- **Geographical information** indicates the location (latitude and longitude) of the served subscriber. When Cell ID or Location Area Code is known the latitude and longitude may be calculated as the nominal central point of the cell or of the location area; alternative mechanisms for determining latitude and longitude may also be supported. The uncertainty of the indicated location is part of the geographical information.
- **Geodetic Information** provides the same functional capability as geographical information; however it is encoded differently.
- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used if the subscriber is using GSM radio access. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.
- **Routing Area ID** indicates the global identity of the current or last GPRS routing area which the subscriber is using or has used if the subscriber is using GSM radio access in a GPRS serving network.
- **Service Area ID** indicates the global identity of the current or last service area which the subscriber is using or has used if the subscriber is using UMTS radio access. The VPLMN shall update the stored Service Area ID at establishment of every radio connection and whenever the subscriber is handed over between service areas.
- **VLR number** is the number of the serving VLR stored in the HPLMN.
- **Location status** indicates whether or not the location information has been confirmed by radio contact. If the location information has not been confirmed by radio contact a time stamp is sent indicating the time elapsed since the last radio contact with the subscriber.

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

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

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

- **CAMEL-busy:** The MS is engaged in a mobile-originated or mobile-terminated circuit-switched call.
- **Network determined not reachable:** The network can determine from its internal data that the MS is not reachable. This includes detached and purged mobile stations.
- **Assumed idle:** The MS is not CAMEL-busy or network determined not reachable.

**GPRS session:** The period during which the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network.

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

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

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

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

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

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

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

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

**IP multimedia session (IPMM session) :** See [11] for definition.

**IM CN subsystem (IP Multimedia Core Network subsystem):** See [11] for definition.

IM application level registration: See [12] for definition.



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## A Procedures for IP multimedia sessions

### A.1 General

~~When a user registers with the IM CN subsystem, sufficient information shall be provided to detect mobile originating or mobile terminating IPMM sessions in the IM CN subsystem.~~ When a mobile originated or mobile terminated IPMM session is detected by the IM CN subsystem, the IM CN subsystem shall decide whether the CSE shall be contacted. If the CSE is contacted the IM CN subsystem shall provide information which includes information taken from the IPMM session and information previously stored in the IM CN subsystem. When the IM CN subsystem contacts the CSE, the IM CN subsystem shall suspend the handling of the IPMM session and make contact with a CSE to ask for instructions.

The IM CN subsystem shall accept the instructions from the CSE and continue IPMM session processing with the received information.

#### A.1.5 IM Application Level Registration procedure

When a user registers on application level with the IM CN subsystem, initial trigger information shall be provided to the IM CN subsystem. Initial trigger information shall be sufficient to enable the IM CN subsystem to detect relevant IPMM sessions and to contact the proper CSE.

The set of information shall at least include the CSE identity to be contacted, the user for which it is valid, the originating and terminating initial event including specific criteria if needed and the service key for the CSE service subscribed to. The initial trigger information for IM CN subsystem shall contain information for the IM CN subsystem only.