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ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 4 92 94 42 00 - Fax: +33 4 93 65 47 16

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Foreword

This Global System for Mobile communications Technical Specification (GTS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This GTS defines the stage 1 description for the first phase of the CAMEL feature (Customized Applications for Mobile network Enhanced Logic) which provides the mechanisms to support services consistently independently of the serving network within the digital cellular telecommunications system (Phase 2/Phase 2+).

GTS are produced by TC-SMG to enable the GSM Phase 2+ specifications to become publicly available, prior to submission for the formal ETSI standards approval procedure to become European Telecommunications Standards (ETS). This ensures the earliest possible access to GSM Phase 2+ specifications for all Manufacturers, Network operators and implementors of the Global System for Mobile communications.

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

Version 5.x.y

where:

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

- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

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1 Scope

This standard specifies the stage 1 description for the first phase of the CAMEL feature (Customized 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.

The CAMEL feature is applicable to mobile originated and mobile terminated call related activities.

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.

The specification of operator specific services in HPLMN are outside the scope of this standard. This specification describes only the interactions between the VPLMN, HPLMN, IPLMN and the CSE.

2 Normative references

This GTS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this GTS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- [1] GSM 01.04 (ETR 350): "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 02.93: "Digital cellular telecommunication system (Phase 2+); Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".
- [3] GSM 02.79: "Digital cellular telecommunication system (Phase 2+); Support of Optimal Routeing (SOR); Service definition (Stage 1)".

3 Definitions and abbreviations

Operator Specific Service (OSS): Any service offered on a PLMN that is not standardized by the GSM ETSSs.

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

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

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

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

CAMEL Subscription Information (CSI): The CSI identifies the subscriber as requiring CAMEL support contains the identity of the CSE and indicates the initial service event to be used. The CSI also contains information related to the OSS of the subscriber, e.g. Service Key.

location information: The location information shall be an identification of the location of the served subscriber. The indication of the geographical location of a subscriber shall be in co-ordinates with an indication of the uncertainty of the location.

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

- Geographical information;
 - Longitude;
 - Latitude;
 - resolution;
- Cell ID;
- VLR number;
- Location status;
- Time stamp (latest location update);
- Location number.

The geographical information (longitude and latitude) is calculated (when the Cell ID or Location Area Code is known) as the nominal central point of the cell or of the location area. The resolution shows the accuracy of the indicated location.

VLR number is the number 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 latest location update for the subscriber.

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

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

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

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

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

assumed idle: Any MS that is not CAMEL-busy or network determined not reachable.

4 Description

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

4.1 Provision of CAMEL

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

4.2 General Procedures

Each GSM process is made up of a series of telecommunication events, some of which are service events. At a service event, the IPLMN or VPLMN may suspend the process and make contact with a CSE to ask for instructions or to send a notification. At this time the IPLMN or VPLMN shall send to the CSE the information listed in this GTS. All information sent to the CSE relates to the served CAMEL subscriber unless otherwise stated. The initial service events, and the corresponding CSE identity, which can initiate contact with the CSE is defined in the CAMEL Subscription Information.

The CAMEL feature is applicable in a PLMN if the CSI is received from the HPLMN.

The CSE shall be capable of responding to the CAMEL request with instructions on how to resume the suspended GSM process. It shall be possible for the CSE to instruct the IPLMN or VPLMN to:

- Activate further service events for potential invocation. These events shall remain active only for the life-time of the telecommunication service;

- Alter information relating to the suspended process;
- Alter information relating to the parties involved in the process;
- Indicate which of the possible parts of the process should occur next (e.g. terminate the call).

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

- MT call;
- MO call (forwarded calls are treated as MO calls).

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

4.3 Applicability of CAMEL to Basic Services

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

5 Procedures for Mobile Originated Calls and Forwarded Calls

5.1 Call setup request procedure

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

If (according to the CSI) the subscriber is provisioned with a CAMEL based originating service and the call setup request event occurs the VPLMN shall suspend call processing, make contact with the CSE and await further instructions.

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

- Event met;
- IMSI;
- Calling Party's Number;
- Calling Party's Category;
- Service Key;
- Location information of the calling subscriber;
- ISDN Bearer Capability;
- High Layer Compatibility;
- Basic Service Code;
- Called Party Number.

For forwarded calls the following information shall be provided to the CSE if available:

- Event met;
- IMSI;
- Calling Party's Number;
- Calling Party's Category;
- Service Key;
- ISDN Bearer Capability;
- High Layer Compatibility;
- Basic Service Code;
- Called Party Number
- Original Called Party Number
- Redirecting Party Number;
- Redirection Information;
- Additional Calling Party Number.

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

- bar the call (i.e. release the call prior to connection);
- allow the call processing to continue unchanged;
- allow the call processing with modified information. The CSE shall have the possibility to send the following information:

- Called Party Number;
- Calling Party's Number;
- Calling Party's Category;
- Original Called Party Number;
- Redirection Party Number;
- Redirection Information.

One and only one of the above instructions can be sent by the CSE at the time. In addition, the CSE may instruct the VPLMN to:

- perform subscriber charging activities. It shall be possible for the CSE to send free-format (fixed length) information to be included in a charging record;
- activate other control service events for the call. The CSE shall have the possibility to send the following information:
 - the service event which shall be detected and reported (Called party connection or Call termination);
 - 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).

5.2 Called party connection procedure

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

If the CSE has activated this service event for this call and the called party connection event occurs the VPLMN shall notify the CSE and continue.

The following information shall be provided to the CSE:

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

5.3 Call disconnection procedure

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

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

The following information shall be provided to the CSE:

- event met;
- the party in the call for which the event is reported;
- type of monitoring;
- disconnection reason.

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

- allow the call processing to continue unchanged, i.e. to release the call;
- perform subscriber charging activities. It shall be possible for the CSE to send free-format (fixed length) information to be included in a charging record.

5.4 CSE initiated call release procedure

Following the CAMEL processing of the Outgoing call request procedure it shall be possible for the CSE to initiate a call release at any moment of the call before the Call disconnection event is encountered.

To use this procedure the CSE shall previously have activated the call disconnection event (with "Type of monitoring" set to control).

6 Procedures for Mobile Terminated Calls

6.1 Incoming call request procedure

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

If (according to the CSI) the subscriber is provisioned with a CAMEL based terminating service and the incoming call request event occurs the IPLMN shall suspend call processing, make contact with the CSE and await further instructions.

For mobile terminated calls the following information shall be provided to the CSE if available:

- Event met;
- Service Key;
- ISDN Bearer Capability;
- High Layer Compatibility;
- Basic Service Code
- Called Party Number;
- Redirecting Number;
- Redirecting Information;
- IMSI;
- Location Number of the calling subscriber (note: the location information of the calling subscriber is not available due to signalling constraints);
- Location information of the called subscriber;
- Calling Party Number;
- Calling Party's Category;
- Original Called Party Number;
- Additional Calling Party Number;
- Subscriber State of the called subscriber.

When contact with the CSE has been made, the CSE shall be able to give instructions as described below:

- bar the call (i.e. release the call prior to connection);
- allow the call processing to continue unchanged;
- allow the call processing with modified information. The CSE shall have the possibility to send the following information:
 - Called Party Number;
 - Calling Party's Number;
 - Calling Party's Category;
 - Original Called Party Number;
 - Redirection Party Number;
 - Redirection Information.

One and only one of the above instructions can be sent by the CSE at the time. In addition, the CSE may instruct the VPLMN to:

- perform subscriber charging activities. It shall be possible for the CSE to send free-format (fixed length) information to be included in a charging record;
- activate other control service events for the call. The CSE shall have the possibility to send the following information:
 - the service event which shall be detected and reported (Called party connection or Call termination);
 - the party in the call for which the event shall be detected and reported (calling or called party);
 - the type of monitoring (control or notification).
- suppress tones and announcements which may be played to the calling party, if an unsuccessful call establishment occurs. This is only applicable when the called party number is unchanged by the CSE.

In the case the CSE instructs the IPLMN to allow the call processing with a changed called party number, the CSE shall indicate whether the resulting call shall be treated by the IPLMN as a forwarded call or not.

Any forwarded call resulting from a CSE Call Forwarding service may cause an invocation of any mobile originated CAMEL based service in the IPLMN.

6.2 Called party connection procedure

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

If the CSE has activated this service event for this call then when the called party connection event occurs the IPLMN shall notify the CSE and continue.

The following information shall be provided to the CSE:

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

6.3 Call disconnection procedure

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

If the CSE has activated this service event for this call and the call disconnection event occurs the IPLMN shall suspend call processing, make contact with the CSE and await further instructions or send a notification and continue.

The following information shall be provided to the CSE:

- event met;
- the party in the call for which the event is reported;
- type of monitoring;
- disconnection reason.

When contact with the CSE has been made, the CSE shall be able to give instructions as described below:

- allow the call processing to continue unchanged, i.e. to release the call;
- perform subscriber charging activities. It shall be possible for the CSE to send free-format (fixed length) information to be included in a charging record.

6.4 CSE initiated call release procedure

Following the CAMEL processing of the incoming call request procedure it shall be possible for the CSE to initiate a call release at any moment of the call before the Call disconnection event is encountered.

To use this procedure the CSE shall previously have activated the call disconnection event [with "Type of monitoring" set to control.]

7 Any time interrogation

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

This may be information from the list below:

- Subscriber Status;
- location information.

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

8 Subscriber interactions with the CSE

Any subscriber procedure is out of the scope of this GTS.

9 Exceptional procedures or unsuccessful outcome

9.1 Roaming in non-supporting networks

The HPLMN shall control handling of roaming, when a CAMEL subscriber attempts to register in a network not supporting CAMEL without relying on extra functionality in network entities not supporting CAMEL. The HPLMN shall have the possibility to decide on a per subscriber basis whether to allow or to deny MO calls and/or MT calls (e.g. applying ODB, denying location up-date).

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

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

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

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

- Mobile originating calls:
Not applicable.

- Mobile terminating calls:
Mobile terminating OSSs are not supported (in the IPLMN).

10 Interactions with supplementary services

10.1 General

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

Call independent supplementary service operations (registration, erasure, activation, deactivation and interrogation) are not modified by CAMEL.

10.2 Line Identification

10.2.1 Calling Line Identification Presentation (CLIP)

The CSE shall be able to change the calling line identities, at both the originating and the terminating side. The CLIP service will not be changed when introducing CAMEL.

NOTE: The CSE's ability to change the calling line identity is provided to modify the identity presented to the called user. Its purpose is not to modify internal network indications that may be used for features such as billing and malicious call identification.

10.2.2 Calling Line Identification Restriction (CLIR)

The CSE shall have the possibility to change the calling line identities and the presentation indicator, at both the originating and the terminating side.

NOTE: The OSS shall assure that the data privacy of the calling subscriber is not violated.

10.2.3 Connected Line Identification Presentation (COLP)

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

10.2.4 Connected Line Identification Restriction (COLR)

No interaction. The CSE is not able to change the restriction indicator.

10.3 Call Forwarding

10.3.1 Call Forwarding Unconditional (CFU)

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

NOTE: Registration of call forwarding is not modified by CAMEL. If any CAMEL-based service leads to called number translation then the registration of call forwarding will still require the user to enter an E.164 format number.

10.3.2 Call Forwarding Busy (CFB)

As for Call Forwarding Unconditional (see subclause 10.3.1).

10.3.3 Call Forwarding on No Reply (CFNRy)

As for Call Forwarding Unconditional (see subclause 10.3.1).

10.3.4 Call Forwarding on Not Reachable (CFNRC)

As for Call Forwarding Unconditional (see subclause 10.3.1).

10.4 Call Completion

10.4.1 Call Hold (CH)

No interaction. For terminating calls, the Call Hold service is invoked after the CAMEL feature is invoked. A call created when a call has been put on hold may be subject to the CAMEL feature in the same way as a normal mobile originating call.

10.4.2 Call Waiting (CW)

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

10.5 Multi Party (MPTY)

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

10.6 Closed User Group (CUG)

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

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

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

10.7 Advice of Charge (AoC)

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

10.8 Call Barring

10.8.1 Barring of all outgoing calls

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

10.8.2 Barring of outgoing international calls

10.8.2.1 Mobile originated calls

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

10.8.2.2 Forwarded Calls

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

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

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

As for Barring of outgoing international calls (see subclause 10.8.2).

10.8.4 Barring of all incoming calls

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

10.8.5 Barring of incoming calls when roaming

Same as Barring of all incoming calls (see subclause 10.8.4).

10.9 Explicit Call Transfer (ECT)

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

10.10 Completion of Call to Busy Subscriber (CCBS)

See GSM 02.93 [2].

11 Interactions with Operator Determined Barring (ODB)

11.1 Barring of all outgoing calls

Same principle as for subclause 10.8.1.

11.2 Barring of all outgoing international calls

Same principle as for subclause 10.8.2.

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

Same principle as for subclause 10.8.3.

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

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

11.5 Barring of outgoing premium rate calls

Same principle as for subclause 11.3. The handling will be the same both for Premium rate information and Premium rate entertainment.

11.6 Barring of incoming calls

Same principle as for subclause 10.8.4.

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

Same principle as for subclause 11.6.

11.8 Operator Specific Barring

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

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

11.9 Barring of Supplementary Services Management

No interaction.

12 Interactions with Optimal Routing (OR)

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

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

Specific interaction is described in GSM 02.79 [3].

13 Cross Phase compatibility with future Phases of CAMEL

Where different entities support different phases of CAMEL it shall operate at the highest common phase. The CAMEL phase 1 is the smallest common unit.

Annex A (informative): Change history

Change history					
SMG No.	TDoc. No.	CR. No.	Section affected	New version	Subject/Comments
SMG#19	365/96	None		2.0.0	Submitted for approval (Approved)
SMG#20		A001	5.1, 5.2, 5.3, 6.1, 6.2, 6.3	5.1.0	Information exchanged between the CSE and the IPLMN/VPLMN
		A002r1	2,3,4.1,5.2,6.1, 6.2,9.2,12		Editorial enhancements and clarifications
		A003	10.2.2		Interaction between CLIR and CAMEL
		A004r1	5.3,6.3,5.4,6.4		CSE initiated call release procedure
		A005	10.1, 10.3.1, 10.8.2		Interaction of CAMEL and Call Forwarding
		A006	3, 7		Subscriber Status
		A007	5.1, 5.3, 6.1 6.3		Editorial change for inclusion of CAMEL charging information
		A008	5.1,6.1		Ambiguity of the current stage 1
		A009	4.2		Information provided about the served subscriber
SMG#21	168/97	A010	10.2.1	5.1.1	Clarification of CAMEL interaction with CLIP

History

Document history	
June 1996	Creation of Version 5.0.0
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March 1997	Publication of Version 5.1.1