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3G Security;
Fraud Information Gathering System (FIGS);
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Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

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1 Scope

This Technical Specification specifies the stage 2 description of the Fraud Information Gathering System (FIGS) feature which provides the means for the HPLMN to monitor the activities of its subscribers in a VPLMN.

Three levels of FIGS service are defined, levels 1 to 3.

Level 1 will use the facilities provided by Transferred Account Procedure (TAP).

Levels 2 and 3 will use facilities provided by Customised Applications for Mobile network Enhanced Logic (CAMEL), in particular, the information flows between the GSM Service Switching Function (gsmSSF) and GSM Service Control Function (gsmSCF). Phase 1 and Phase 2 CAMEL facilities will be used.

Connection-orientated services only are covered.

2 Normative references

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. 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] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] 3GPP TS 42.031: “Digital cellular telecommunications system (Phase 2+); Fraud Information Gathering System (FIGS) - Stage 1".

[3] GSM 03.78: “Digital cellular telecommunications system (Phase 2+); Customised Application for Mobile network Enhanced Logic (CAMEL Phase 1)” - stage 2; version 5.x.y". (GSM Release 96)

[4] GSM 03.78: “Digital cellular telecommunications system (Phase 2+); Customised Application for Mobile network Enhanced Logic (CAMEL Phase 2) - stage 2; version 6.x.y". (GSM Release 97)

NOTE: [3] specifies CAMEL Phase 1 functionality, [4] specifies CAMEL Phase 2 functionality.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this specification the following definitions apply:

A subscriber: The calling mobile subscriber.

B subscriber: The mobile subscriber originally called by the A subscriber.

C subscriber: The subscriber to whom the B subscriber has requested that calls be forwarded. The C subscriber may be fixed or mobile.

call: connection-oriented service/event.

GSM Service Control Function (gsmSCF): A functional entity that contains the CAMEL service logic to implement OSS. It interfaces with the gsmSSF and the HLR.

GSM Service Switching Function (gsmSSF): A functional entity that interfaces the MSC/GMSC to the gsmSCF. The concept of the gsmSSF is derived from the IN gsmSSF, but uses different triggering mechanisms because of the nature of the mobile network.

Originating CAMEL Subscription Information (O-CSI): The O-CSI identifies the subscriber as having originating CAMEL services.

Supplementary Service Notification CAMEL Subscription Information (SS-CSI): The SS-CSI identifies the subscriber as having supplementary service invocation notification CAMEL services.

Terminating CAMEL Subscription Information (T-CSI): The T-CSI identifies the subscriber as having terminating CAMEL services.

VMSC: The serving MSC in the VPLMN.

3.2 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

For the purposes of this specification the following abbreviations apply:

CAMEL	Customised Applications for Mobile network Enhanced Logic
CGI	Cell Global Identifier
FIGS	Fraud Information Gathering System
FDS	Fraud Detection System
MO	Mobile Originated
MT	Mobile Terminated
O-CSI	Originating CAMEL Subscription Information
OSS	Operator Specific Services
SS-CSI	Supplementary Service Notification CAMEL Subscription Information
T-CSI	Terminating CAMEL Subscription Information
TAP	Transferred Account Procedure

4 FIGS Monitoring Levels

There are three levels of monitoring of subscriber activities using FIGS.

Level 1 an accelerated TAP procedure associated with a mechanism such as Hot Billing is implemented in the MSC of the VPLMN.

Level 2 CAMEL is used to gather information, but only at the beginning and the end of the call.

Level 3 CAMEL provides full information on subscriber activities, as defined in 3GPP TS 42.031, i.e. call start and end times, and partial call records. Notification of the invocation of Explicit Call Transfer, Call Deflection, Call Forwarding, Call Hold and Multi Party Service is also given.

5 FIGS Level 1: Accelerated TAP Records

5.1 Method of FIGS Setting

A PLMN shall request that a VPLMN monitor a designated subscriber using FIGS level 1 by setting a Hot Billing flag in the subscriber data stored in the HLR of the HPLMN. This data is drawn down by the VPLMN when the subscriber first registers in the VPLMN.

If the HPLMN wishes to begin monitoring of a subscriber using FIGS Level 1 when the subscriber is already registered in the VPLMN, it resets the subscriber data in the VPLMN using command *Insert Subscriber Data*.

5.2 Information Flows

If a subscriber in a VPLMN is set in the subscriber categories to be monitored using FIGS Level 1 the VMSC shall process and return the TAP records for that subscriber in accordance with the guidelines given in current and future version of TAP.

6 FIGS and CAMEL Architecture for FIGS Levels 2 and 3

FIGS provides the following information flows to the HPLMN, with respect to roaming subscribers monitored by FIGS Levels 2 and 3.

FIGS Level 2:

> **call start and end times** (both MO, MT and forwarded calls). (At CAMEL Phase 1 the gsmSSF will not put a timestamp on messages. The arrival times of messages at the gsmSCF will be used for call start and end times.)

FIGS Level 3:

As for level 2 with the addition of:

partial call information (accumulated duration of call still in progress) (CAMEL Phase only);

notification of the invocation of ECT, CD and MPTY, CF and call hold (CAMEL Phase 2 only).

Further phases of CAMEL will provide the functionality to check the IMEI of the ME used by a CAMEL subscriber. Other information required by 3GPP TS 42.031, annex A, that is not provided by CAMEL Phase 1 and CAMEL Phase 2, may also be provided by further phases of CAMEL.

The architecture of the services provided by FIGS Levels 2 and 3 is given in the diagrams below. Thick lines indicate possible CAMEL monitoring/control relationships.

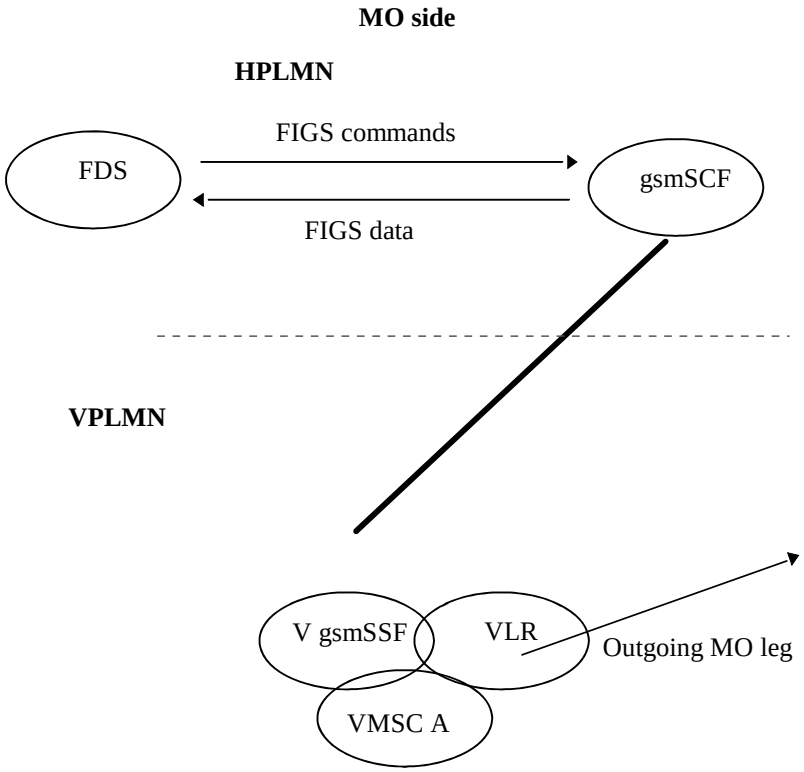

Figure 1: FIGS architecture for MO call

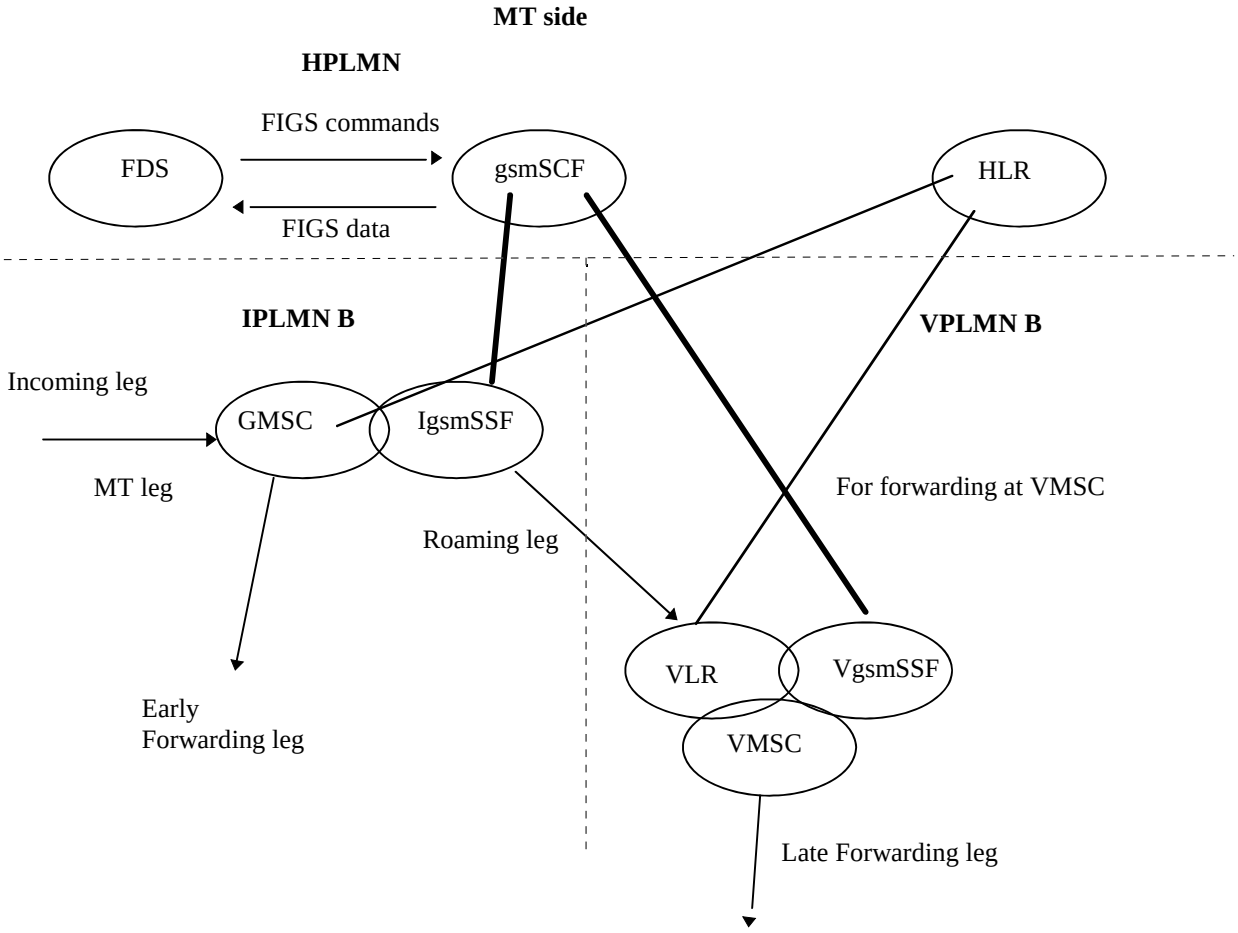

Figure 2: FIGS Architecture for MT/forwarded call

Early call forwarding can be performed if the subscriber has set Unconditional Call Forward or the HLR has determined, before the call is extended to VPLMN B, that the B subscriber is not reachable. In all other cases the call must be extended to the VMSC.

The information flows required by FIGS levels 2 and 3 can be provided by the information flows on the CAP interfaces between the gsmSCF and the gsmSSF in the interrogating and visiting networks.

The interface between the gsmSCF and the Fraud Detection System (FDS) is non-standard.

7 FIGS Levels 2 and 3

7.1 Method of FIGS Setting

A PLMN shall request that a VPLMN monitor a designated subscriber using FIGS levels 2 or 3 by setting the O-CSI, T-CSI and SS-CSI (level 3 only) flags in the subscriber data stored in the HLR of the HPLMN. This data is drawn down by the VPLMN when the subscriber first registers in the VPLMN.

If the HPLMN wishes to begin monitoring of a subscriber using FIGS Level 2 or 3 when the subscriber is already registered in the VPLMN, it resets the subscriber data in the VPLMN using command *Insert Subscriber Data*.

7.2 Information Flows

FIGS Levels 2 and 3 will be treated together in this section but it should be remembered that partial call records and SS notification invocation is not available with FIGS Level 2.

Each item of call data required by FIGS will be considered in turn and the information flows within CAMEL which provide this data given.

Text applies to the implementation of FIGS functionality using both Phases 1 and 2, unless otherwise stated.

MO and MT calls will be treated together. If a message or DP is named as *O/T_Answer*, for instance, this means that if the call is MO, the relevant DP is *O_answer*, and that if the call is MT, the relevant DP is *T_answer*.

Diagrams showing the information flows for FIGS levels 2 and 3 are given in Annex A.

7.2.1 Mobile Originated and Mobile Terminated Calls

7.2.1.1 Call Start Time

Information regarding a call attempt can be obtained from the *InitialDP* message sent from the gsmSSF to the gsmSCF. This message is sent after a control relationship for the call has been set up between the gsmSSF and gsmSCF. This message will provide notification to the FDS that a FIGS monitored subscriber has made a call **attempt**, or that an attempt is being made to call a FIGS monitored subscriber.

CAMEL Phase 1

The call, however, has not been connected at the time of the *InitialDP* message. The gsmSCF must therefore arm DP *O/T_answer*, so that the gsmSSF will inform the gsmSCF when the called party answers/connects. The gsmSCF arms the DP with message *Request_Report_BCSM_Event* sent to the gsmSSF.

If the called party answers, the gsmSSF sends *Event_Report_BCSM (Notify and Continue)* to gsmSCF. This message provides notification to the FDS that the attempted call has begun. The gsmSCF must then arm DP *O/T_Disconnect*, so that the gsmSSF will notify the gsmSCF when the call ends.

If the called party does not answer, the gsmSSF terminates the relationship for the call with the gsmSCF. It does this using message "*ABORT*". This message provides notification to the FDS that the call attempted did not connect.

CAMEL Phase 2

The call, however, has not been connected at the time of the *InitialDP* message. The gsmSCF must therefore arm DP *O/T_Answer*, so that the gsmSSF will inform the gsmSCF when the called party answers/connects. The following DP's (with trigger events given) must also be armed so that the gsmSCF will be informed if the trigger event occurs:

O_Route_Select_Failure (call establishment fails, MO calls only)

O/T_Busy (called party is busy)

O/T_No_Answer (no answer from called party)

O/T_Abandon (calling party abandons the call before the called party has answered)

O/T_Not_Reachable (called party is not reachable)

For the purposes of FIGS, these DP's need only be armed for notification (N).

The gsmSCF arms all these DPs with a single message *Request_Report_BCSM_Event*, sent to the gsmSSF.

If the trigger event for any of *O_Route_Select_Failure*, *O/T_Busy*, *O/T_No_Answer*, *O/T_Not_Reachable* occurs then the gsmSCF is informed by the gsmSSF of the failure of the call attempt with *Event_Report_BCSM*, enclosing the relevant cause.

If the called party answers, the gsmSSF sends message *Event_Report_BCSM* to the gsmSCF. This message provides notification to the FDS of the start of a call by a FIGS monitored subscriber. The gsmSCF must then arm DP *O/T_Disconnect*, so that the gsmSSF will notify the gsmSCF when the call ends.

7.2.1.2 Partial Call Records

This functionality is available with CAMEL Phase 2 only.

Using the "Apply Charging" process within CAMEL Phase 2, the gsmSCF can control the duration of a call. The gsmSCF authorises the gsmSSF to allow the call to proceed continue for a certain time. At the conclusion of this time period, the gsmSSF seeks further instructions from the gsmSCF. The gsmSCF can, at this point, authorise the call to continue for another time period (which may be different to the first) or may instruct the gsmSSF to terminate the call.

With regard to FIGS, this functionality can be used to generate **partial call records** for the gsmSCF, as follows:

After the gsmSCF has received the *InitialDP* message from the gsmSSF, the gsmSCF sends message *Apply_Charging* to the gsmSSF, containing parameter "Tcs", the "call segment" duration. The gsmSSF will then send message *Apply_Charging_Report* to the gsmSCF after *Tcs* seconds. This message c

ontains the duration of the call since the start of charging The gsmSCF may then instruct the gsmSSF to allow the call to continue for another *Tcs* seconds and this sequence of events continues until the call is released. When the call is released, *Apply_Charging_Report* is sent to the gsmSCF.

The gsmSCF can therefore define how often it is to receive partial call records on a per subscriber, per call basis, and can change how often the partial call records are received during a call

7.2.1.3 Call End Time

When either of the calling or called parties releases the call, the *O/T-Disconnect* DP is triggered and message *Event_Report_BCSM* is sent to the gsmSCF. This message provides notification to the FDS of the call end.

7.2.2 Forwarded Call

7.2.2.1 Call Start Time

The forwarded leg “from” the called party to the forwarded-to number is considered as an MO call, originated by the called subscriber, as well as an MT call for the called subscriber. Two separate CAMEL dialogues will therefore be set up.

The CAMEL process for the terminating leg will follow subclause 7.1 as an MT call and the CAMEL process for the “originating” (forwarded) leg will follow subclause 7.1 as an MO call.

7.2.2.2 Partial Call Records

As for subclause 7.1.2.

7.2.2.3 Call End Time

As for subclause 7.1.3.

7.2.3 Supplementary Service Invocation

This functionality is available with CAMEL Phase 2 only.

From CAMEL Phase 2 (GSM 03.78 Release 97), subclause 8.11:

"At the invocation of any of the services ECT, CD and MPTY the MSC/VLR checks whether the criteria for sending a notification is fulfilled, i.e. whether the subscriber is provisioned with the SS-CSI and the particular invoked supplementary service is marked in the SS-CSI. If this is the case a notification is sent to the gsmSCF given by the gsmSCF address contained in the SS-CSI. The processing of the particular SS invocation is not suspended. If the notification criteria is not fulfilled the processing of the particular supplementary service continues unchanged and no notification is sent.

The sending of the notification is independent of call related CAMEL processing, i.e. processing indicated by O/T-CSI."

Annex A (informative): FIGS Data provided by CAMEL Messages

GSM 02.33 lists the information that should be present in FIGS Data messages. Tables A.1 to A.3 show the information required by GSM 02.33 for call start and end and partial call records, and the CAMEL messages, if any, that provide this information. Note that partial call records are only available with FIGS Level 3.

The CAMEL message given for a particular call event, e.g. call end, will not necessarily arrive at that event. The FDS must have the ability to build up a full picture of a call as various CAMEL messages are received.

Table A.1: Required Call Start information

Information	**MO**	**MT**	**CF**
Dialled digits	*InitialDP (IDP), Called Party BCD Number*	*IDP, Called Party Number*	*IDP, Called Party Number*
A party number	*IDP, Calling Party Number*	*IDP, Calling Party Number*, if available	*IDP, Calling Party Number*, if available
B party number	*IDP, Called Party BCD Number*	*IDP, Called Party Number*	*IDP, Called Party Number*
Modified B party number	gsmSCF	gsmSCF	gsmSCF
C party number	n/a	n/a	*Called Party Number*
Modified C party number	gsmSCF	gsmSCF	gsmSCF
CGI (of A party)	*IDP, Location Number*	location number in ISUP signalling, if available	location number in ISUP signalling, if available
IMSI	*IDP, IMSI* (of A party)	*IDP, IMSI* (of B party)	*IDP, IMSI* (of B party)
IMEI (of A party)	Not available	Not available	Not available
Call Start Time/Date	Phase 1: arrival time of *Event_Report_BCSM* Phase 2: Timestamp on *Event_Report_BCSM*	Phase 1: arrival time of *Event_Report_BCSM* Phase 2: Timestamp on *Event_Report_BCSM*	Phase 1: arrival time of *Event_Report_BCSM* Phase 2: Timestamp on *Event_Report_BCSM*
Call Reference	*IDP, Call Reference_Number*	*IDP, Call Reference_Number*	*IDP, Call Reference_Number*
MO/MT indicator	*IDP, Event Type BCSM*	*IDP, Event Type BCSM*	*IDP, Event Type BCSM*
Visited MSC address	*IDP, MSC Address*	*IDP, MSC Address*	*IDP, MSC Address*
Type of service	*IDP, Basic Service Code, if available*	*IDP, Basic Service Code, if available*	*IDP, Basic Service Code, if available*

Dialed digits: This always gives (for MO calls) the number originally entered by the party making the call, including any non-numeric characters.

Modified B/C party number: As the number is modified by the gsmSCF itself, it is assumed that the FDS will have direct access to this field and need not scan outgoing messages from the gsmSCF to obtain the field. If, however, the FDS must scan outgoing messages, the field is given in field Destination Routing Address in message Connect.

Cell Global Identifier **(CGI)**: refers to the cell used by the MS at the start of the call.

Table A.2: Required Call End information

Information	**MO**	**MT**	**CF**
A party number	*IDP, Calling Party Number*	*IDP, Calling Party Number*, if available	*IDP, Calling Party Number*, if available
B party number	*IDP, Called Party BCD Number*	*IDP, Called Party Number*	*IDP, Called Party Number*
Modified B party number	gsmSCF	gsmSCF	gsmSCF
CGI	*IDP, Location Number*	location number in ISUP signalling, if available	location number in ISUP signalling, if available
IMSI	*IDP, IMSI* (of A party)	*IDP, IMSI* (of B party)	*IDP, IMSI* (of B party)
IMEI	Not available	Not available	Not available
Call Duration/end	Phase 1: Arrival time, Phase 2: Timestamp, of *Event_Report_BCSM* (with *Event_Type_BCSM = O/T_Disconnect*)	Phase 1: Arrival time, Phase 2: Timestamp, of *Event_Report_BCSM* (with *Event_Type_BCSM = O/T_Disconnect*)	Phase 1: Arrival time, Phase 2: Timestamp, of *Event_Report_BCSM* (with *Event_Type_BCSM = O/T_Disconnect*)
Call Reference	*IDP, Call Reference_Number*	*IDP, Call Reference_Number*	*IDP, Call Reference_Number*
MO/MT indicator	*IDP, Event Type BCSM*	*IDP, Event Type BCSM*	*IDP, Event Type BCSM*

CGI. If available, the CGI of the cell used by the MS at the end of the call is used. If this is not available, the CGI of the cell used at the start of the call is given.

Table A.3: Required Partial Call Information (CAMEL Phase 2 only)

Information	**MO**	**MT**	**CF**
Dialled digits	*InitialDP (IDP), Called Party BCD Number*	*IDP, Called Party Number*	*IDP, Called Party Number*
A party number	*IDP, Calling Party Number*	*IDP, Calling Party Number,* if available	*IDP, Calling Party Number,* if available
B party number	*IDP, Called Party BCD Number*	*IDP, Called Party Number*	*IDP, Called Party Number*
Modified B party number	gsmSCF	gsmSCF	gsmSCF
C party number	n/a	n/a	*Called Party Number*
Modified C party number	gsmSCF	gsmSCF	gsmSCF
CGI	*IDP, Location Number*	location number in ISUP signalling, if available	location number in ISUP signalling, if available
IMSI	*IDP, IMSI* (of A party)	*IDP, IMSI* (of B party)	*IDP, IMSI* (of B party)
IMEI	Not available	Not available	Not available
Call Start Time/Date	Phase 1: arrival time of *Event_Report_BCSM* Phase 2: Timestamp on *Event_Report_BCSM*	Phase 1: arrival time of *Event_Report_BCSM* Phase 2: Timestamp on *Event_Report_BCSM*	Phase 1: arrival time of *Event_Report_BCSM* Phase 2: Timestamp on *Event_Report_BCSM*
Call Duration	*Apply_Charging_Report, Time Since Start of Charging*	*Apply_Charging_Report, Time Since Start of Charging*	*Apply_Charging_Report, Time Since Start of Charging*
Call Reference	*IDP, Call Reference_Number*	*IDP, Call Reference_Number*	*IDP, Call Reference_Number*
MO/MT indicator	*IDP, Event Type BCSM*	*IDP, Event Type BCSM*	*IDP, Event Type BCSM*
Visited MSC address	*IDP, MSC Address*	*IDP, MSC Address*	*IDP, MSC Address*
Type of service	*IDP, Basic Service Code, if available*	*IDP, Basic Service Code, if available*	*IDP, Basic Service Code, if available*

The CAMEL message for SS invocation notification have not yet been defined so the call information for SS invocation notification can only be specified in general terms.

The notification of supplementary service (SS) invocation will be the same as table A.3, except that information field "Type of Service" will be "Type of SS", and "Call Duration" will be "Time of SS invocation". "Type of SS" will be given in the invocation notification sent from the gsmSSF to the gsmSCF. "Time of SS invocation" will be the timestamp in the invocation notification or its time of arrival at the gsmSCF.

Annex B (informative): Information Flow for FIGS Levels 2 and 3

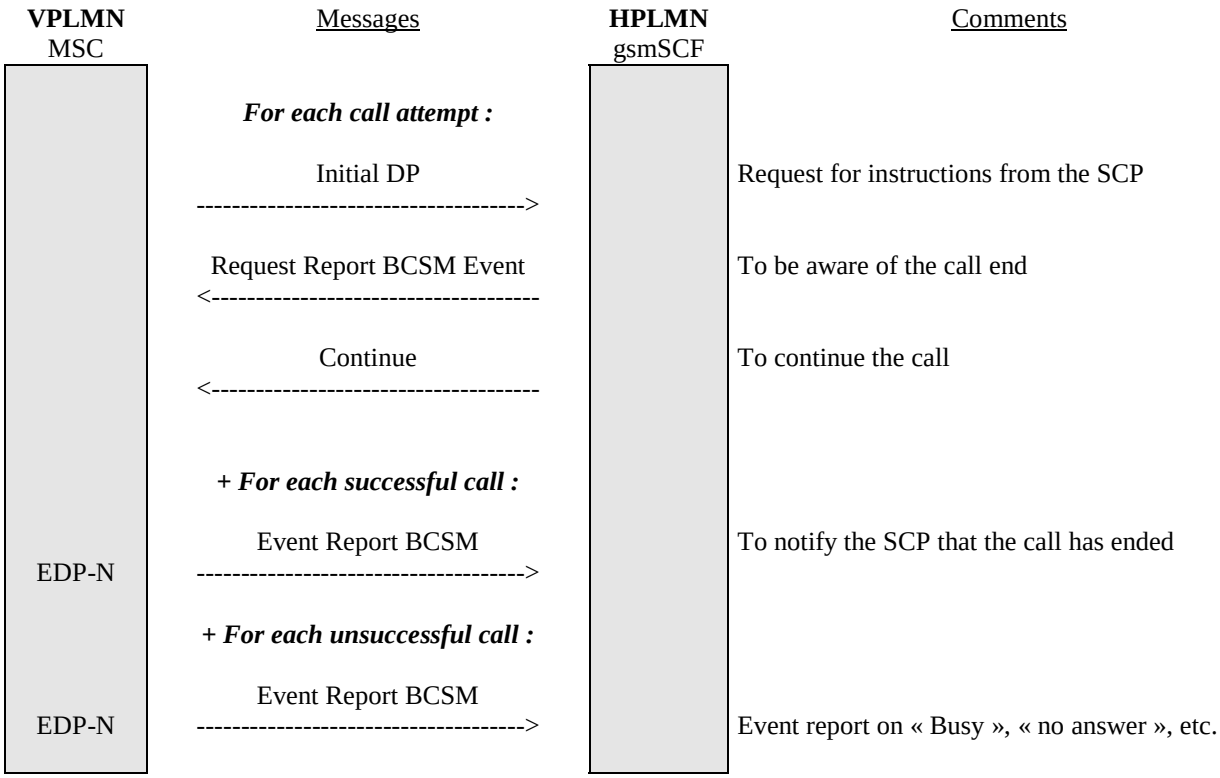

Figure B.1: Message flow for a subscriber monitored using FIGS Level 2

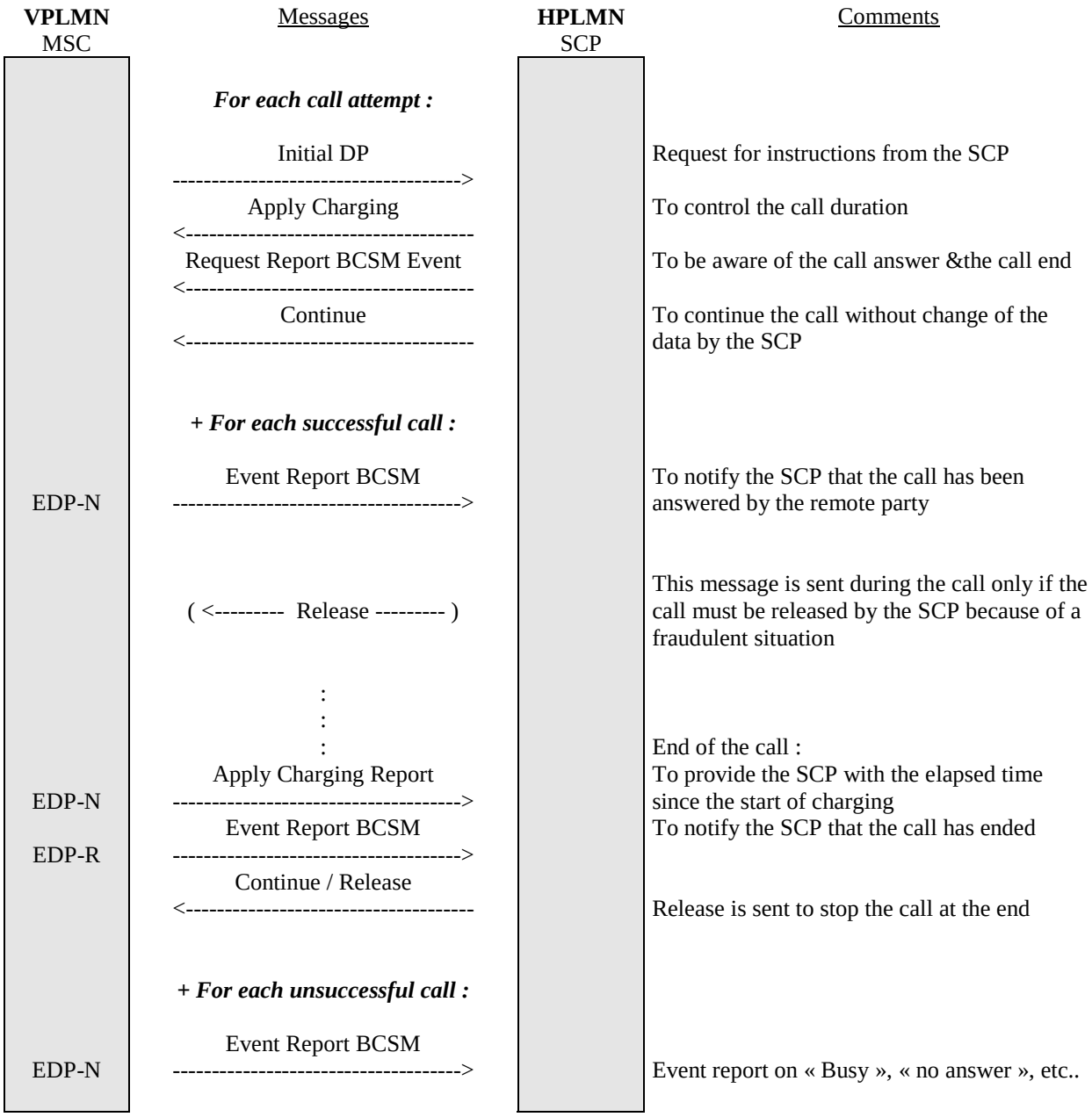

Figure B.2: Message flow for a subscriber monitored using FIGS Level 3

Annex C (informative): Change history

Change history GSM 03.31							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
					No Phase 1 version		
03-1998	SMG#25				(cleaned up by SMG-PN) To SMG#25 for information		1.0.0
06-1998	SMG#26				To SMG#26 for approval		2.0.0
06-1998	SMG#26				TS approved by SMG#26	2.0.0	7.0.0
04-2000					Release 1999 version	7.0.0	8.0.0
Change history 3GPP TS 43.031							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
03-2001	SA#11				Upgrade to Release 4 (3GPP numbering)	03.31 V8.0.0	43.031 V4.0.0
06-2002	SA#16				Upgrade to Release 5	4.0.0	5.0.0
Change history 3GPP TS 23.031							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
12-2002	SA#18				Agreed to convert to 3GPP/GSM joint numbering scheme. **43.031 WITHDRAWN.** **Technically equivalent to 43.031 version 5.0.0**	43.031 v5.0.0	23.031 v5.0.0
12-2004	SA#26				Upgrade to Release 6	5.0.0	6.0.0
06-2007	SA#36				Upgrade to Release 7	6.0.0	7.0.0
12-2008	SA#42				Upgrade to Release 8	7.0.0	8.0.0
12-2009	SA#46				Upgrade to Release 9	8.0.0	9.0.0
2011-03	-	-	-	-	Update to Rel-10 version (MCC)	9.0.0	10.0.0
2012-09	-	-	-	-	Update to Rel-11 version (MCC)	10.0.0	**11.0.0**
2014-09	-	-	-	-	Update to Rel-12 version (MCC)	11.0.0	**12.0.0**
2016-01	-	-	-	-	Update to Rel-13 version (MCC)	12.0.0	**13.0.0**
2017-03	-	-	-	-	Update to Rel-14 version (MCC)	13.0.0	**14.0.0**

History

Document history		
V14.0.0	March 2017	Publication