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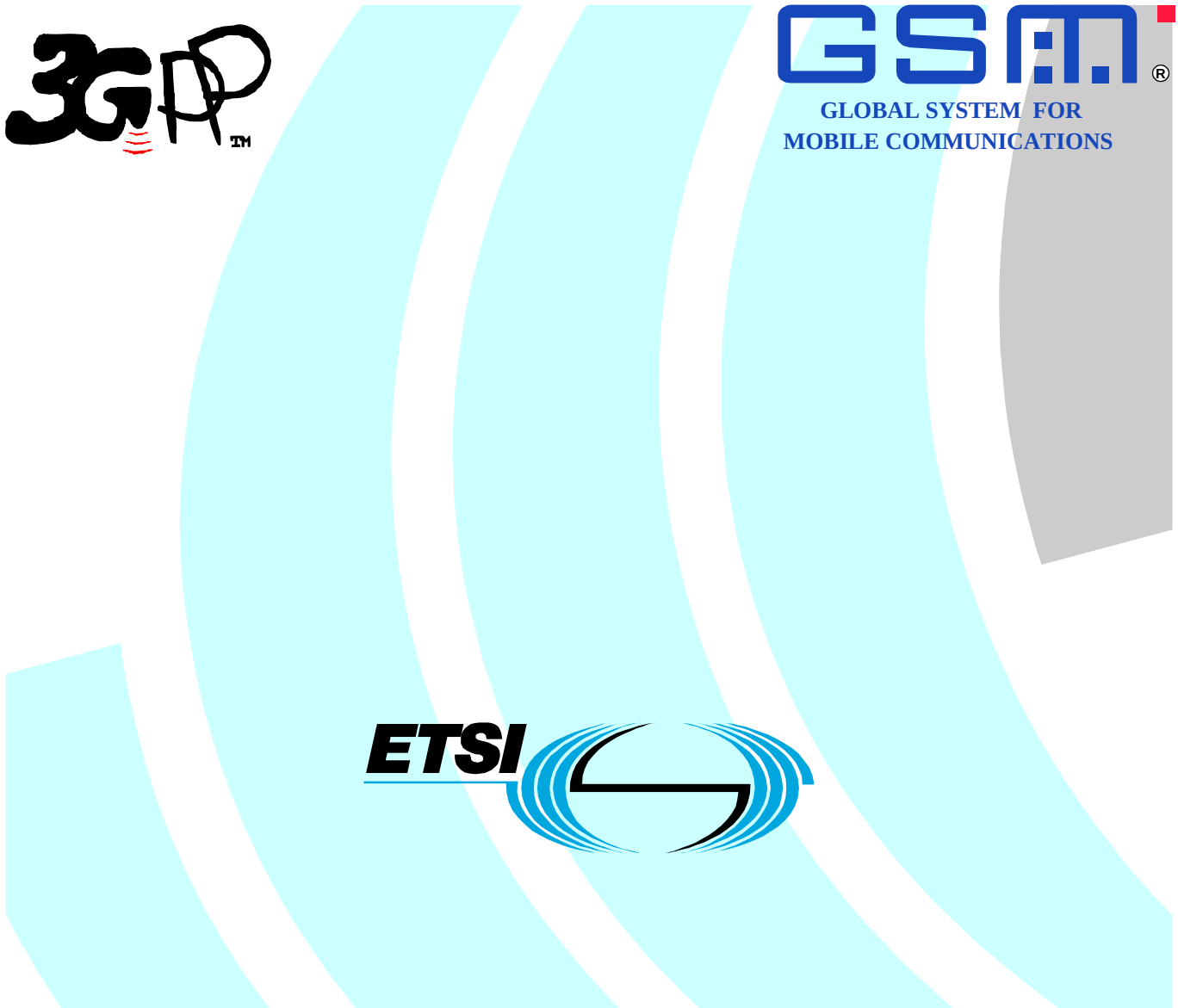

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Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

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Contents

Foreword

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

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

Version x.y.z

where:

- x the first digit:
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  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This Technical Specification specifies the stage 2 description of the Immediate Service Termination (IST) service which provides the means for the HPLMN to terminate all the activities of an HPLMN subscriber in a VPLMN.

Two implementations of IST are described: an implementation based on CAMEL, and an implementation based on a new MAP message.

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 TR 21.905: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.032: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Immediate Service Termination (IST), Service description - Stage 1".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Subscriber activities: subscriber activities that must be terminated. These can be call related events (e.g. call set-up, call termination) or the invocation of call related and call independent supplementary services (e.g. Call Hold, Call Waiting, Call Transfer, Call Forwarding, Unstructured Supplementary Service Data (USSD)).

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following abbreviations apply:

IST	Immediate Service Termination
FDS	Fraud Detection System
FIGS	Fraud Information Gathering System
MO	Mobile Originated
MT	Mobile Terminated
O-CSI	Originating CAMEL Subscription Information
T-CSI	Terminating CAMEL Subscription Information

4 Information flows

4.1 CAMEL implementation

For the Customised Applications for Mobile network Enhanced Logic (CAMEL) implementation of Immediate Service Termination (IST) for a particular subscriber, an "IST" command (in reality, the CAMEL message "ReleaseCall") must be sent by the gsmSCF of the home PLMN to the gsmSSF controlling the call, for all the calls of the subscriber.

Prior to the sending of the IST command, the Mobile Application Part (MAP) command "Cancel Location" should be sent to the VLR at which the subscriber is registered. This will ensure that the subscriber cannot re-commence service at that VLR after the IST command has been executed. See Annex A of TS 22.032 [2].

The compilation of the list of MSCs to which the IST command should be sent is outside the scope of this specification. However, if a PLMN operator wishes to implement IST using CAMEL, the list of MSCs to which the IST command should be sent for a subscriber is the list of MSCs with which the CAMEL server has a relationship for that subscriber. If this data is not available directly from the CAMEL server, it may be obtained using Fraud Information Gathering System (FIGS) or an Fraud Detection System (FDS) (if the HPLMN is using CAMEL for IST then it is likely that it will also be monitoring the subscriber"s activities using FIGS level 2 or 3, which use CAMEL).

4.2 Non-CAMEL implementation

For each non-CAMEL-subscriber under IST control, the HLR shall request the MSCs during location update and routeing information retrieval to report for each remaining activity periodically at the frequency defined by the IST Alert timer value about the remaining activity for this subscriber in the node by sending an IST Alert Message to the HLR, as long as the activity is ongoing. The IST Alert timer value is set by HPLMN and communicated to VPLMN and IPLMN on subscriber basis.

The HLR shall be able to request termination of ongoing call activities for a subscriber by returning a call termination indicator to the MSC in response to the IST Alert message initiated by this MSC. When this call termination indicator is received, the MSC shall terminate the call activities for that subscriber (the MSC shall terminate the call activity that triggered the IST Alert dialogue, and optionally other call activities in that MSC if the MSC is able to link the calls related to the subscriber).

As an implementation option the HLR may for each non-CAMEL-subscriber under IST control maintain a list of MSCs which possibly have ongoing activities for the subscriber. The HLR may then send at any time (i.e. without waiting for the IST Alert message) an unsolicited IST Command message to these MSCs in order to request termination of all ongoing activities for the subscriber. The HLR should send unsolicited IST Command message only to those MSCs that are likely to be carrying a call that needs to be terminated.

Before sending of any IST Command message for a subscriber, the HLR should send the MAP Cancel Location message to the VLR at which the subscriber is registered. This will ensure that the subscriber cannot re-commence service at the corresponding MSC after the IST Command message has been executed. See Annex A of TS 22.032 [2]. The MSC shall be prepared to receive an IST Command message before and/or after the subscriber record has been removed from the VLR.

5 Functional behaviour - CAMEL implementation

This clause describes the implementation of IST using CAMEL. CAMEL can be used to terminate all the mobile originated (MO), mobile terminated (MT) and forwarded (CF) calls of a subscriber, provided there is a control relationship between the CAMEL server (the gsmSCF) in the HPLMN and the MSC (visited MSC or GMSC) (the gsmSSF) controlling the call or forwarding leg.

5.1 Subscriber settings

The subscriber is marked as a CAMEL subscriber by setting Originating CAMEL Subscription Information (O-CSI) and Terminating CAMEL Subscription Information (T-CSI) in the subscriber data stored in the HLR of the HPLMN. The O-CSI is sent to the VPLMN when the subscriber first registers in the VPLMN; the T-CSI is sent to the GMSC in the response to a request for routeing information. If the subscriber is being monitored using FIGS, it will already be marked as a CAMEL subscriber.

If the HPLMN wishes to mark a subscriber as a CAMEL subscriber when the subscriber is already registered in the VPLMN, it modifies the subscriber data in the VPLMN using the command *Insert Subscriber Data*.

5.2 DP Settings

A call cannot be terminated using CAMEL unless there is a control relationship between the gsmSCF and the gsmSSF controlling the call. To ensure that the IST command can be used at any point in the duration of a call, right up to the end of the call, there must be a control relationship until the end of the call.

A "control relationship" exists where there is at least one armed DP in the gsmSSF. This can be achieved if the DP *O/T_Disconnect* (which will trigger the sending of an *Event_Report_BCSM* to the gsmSCF) is set for the call.

If the subscriber is being monitored using FIGS level 2 or 3, the subscriber will already be marked as a CAMEL subscriber and DP *O/T_Disconnect* will already have been set.

If the subscriber is not being monitored using FIGS levels 2 or 3 then *O/T_Disconnect* is set with command *Request_Report_BCSM_Event* sent to the gsmSSF by the gsmSCF after the gsmSCF has received notification of a call attempt via the *Initial_DP* message received from the gsmSSF.

Initial_DP notifies the gsmSCF of call attempts. If the gsmSCF wishes to be notified of the success or failure of a call attempt, and so not be keeping a register of "calls" that may not have commenced, DP *O/T_Answer* can be set to inform the gsmSCF when a call is answered by the calling party.

If the **non**-reception of an *Event_Report_BCSM* indicating call answer is **not** sufficient indication to the HPLMN of the failure of a call attempt, DPs *O_Route_Select_Failure, O/T_Busy, O/T_No_Answer, O/T_Abandon, O/T_Not_Reachable* can be set to inform the gsmSCF explicitly if the call attempt fails. If the various failure DPs are not armed, the gsmSCF can still deduce that the call attempt has failed because the gsmSSF will terminate the relationship when the call fails by sending message *Abort* to the gsmSCF.

All these DPs can be set via the *Request_Report_BCSM_Event* sent to the gsmSSF by the gsmSCF after receiving the *InitialDP* message. If all these DPs are set then the subscriber is in fact being monitored with the equivalent of FIGS level 2 monitoring.

5.3 Call termination

The HPLMN will be informed of the call attempts (MO, MT and CF) of the subscriber with message *InitialDP*. This message will give the address of the gsmSSF (=MSC) controlling the call. The call can be terminated by the gsmSSF at any time by sending message *ReleaseCall* to the controlling gsmSSF. The gsmSSF will then terminate the call.

6 Functional behaviour - Non-CAMEL implementation

This clause describes the implementation of IST using non-CAMEL implementation. This mechanism can be used to terminate all the originated (MO), terminated (MT) Deflected (CD), Transferred (ECT) and forwarded (CF) calls of a

subscriber, provided that this IST mechanism is supported in the HLR and in the serving MSC/VLRs (visited MSC or GMSC controlling the call or forwarding leg).

6.1 Subscriber Settings

The subscriber is marked as a non-CAMEL IST subscriber by setting an IST Alert timer value in the subscriber data stored in the HLR. The IST Alert timer value is sent to the VLR in response to an Update Location request which indicates that the MSC/VLR supports IST; the IST Alert timer value is sent to the GMSC in the response to a request for routeing information which indicates that the GMSC supports IST.

The IST Alert timer value is in a range from 15 to 255 minutes with steps of 1 minute. For the subscribers not marked as IST non-CAMEL subscribers, the IST Alert timer value is not transmitted to the VLR or to the GMSC. The IST Alert timer value may be assigned on subscriber basis depending on the risk associated to the specific subscriber. As a network option the IST Alert timer value transmitted for a certain subscriber may be different for different entities (or PLMNs).

If the HLR operator wishes to mark a subscriber as a non-CAMEL IST subscriber when the subscriber is already registered in a VLR, provided that the VLR supports IST, the HLR modifies the subscriber data in the VLR using the MAP Insert Subscriber Data message. Note that this does not affect already ongoing activities in the MSC. If the subscriber is under IST condition and the HLR operator decides to remove this condition, the HLR modifies the subscriber data in the VLR using the MAP Delete Subscriber Data message. Note that this does not affect the operation of any timer which is currently running.

6.2 Periodic reporting mechanism

6.2.1 IST Alert timer Settings

The call termination shall be provided based on a "notification relationship". The HLR shall request to the MSCs during location update and routing information retrieval to report for each remaining activity periodically at the frequency defined by the IST Alert timer value about the remaining activity for that subscriber in the node by sending an IST Alert message to the HLR, as long as the activity is ongoing.

The timer supervision starts in the MSC after initiation of any outgoing call activity [MO, CD, CF, ECT calls] for that subscriber. A separate timer supervision shall be initiated per each outgoing call activity for each subscriber. The notification IST Alert message is then transmitted to the HLR per call activity whenever the IST Alert timer running for that call expires. When the HLR receives an IST Alert message from an MSC, it can either return an empty result component, return a component including the subscribed IST Alert timer value, return an indication that the IST condition has been removed for the subscriber or return a call termination indicator. This returned call termination indicator is used by the MSC to terminate the outgoing call activities (either the call activity that initiated the IST Alert dialogue, or optionally to release all outgoing call activities) for that subscriber in the MSC. Release of all call activities using the returned call termination indicator is possible only if the MSC is able to link all call activities related to that subscriber. If the HLR has returned an indication that the IST condition has been removed from the subscriber, IST control for that call in the MSC is terminated. The IST Alert timer that monitors the activity that initiated the IST Alert is restarted when no call termination indicator has been received in the IST Alert dialogue and the IST Alert response received does not indicate termination of IST condition; the IST Alert timer value shall be the same as in the previous count, or the new value received in the IST Alert response if any.

The timer supervision starts in the GMSC after reception of the response to a request for routeing information. A separate timer supervision shall be initiated per each incoming call activity [MT, CF] for each subscriber An IST Alert message is then transmitted to the HLR per call activity whenever the IST Alert timer running for that call expires. When the HLR receives an IST Alert message from a GMSC, it can either return an empty result component, return a component including the subscribed IST Alert timer value, return an indication that the IST condition has been withdrawn for the subscriber or return a call termination indicator. This returned call termination indicator is used by the GMSC to terminate the incoming call activities (either the call activity that initiated the IST Alert dialogue, or optionally to release all incoming call activities) for that subscriber in the GMSC. Release of all incoming call activities using the returned call termination indicator is possible only if the GMSC is able to link all call activities related to that subscriber. If the HLR has returned an indication that IST condition has been withdrawn from the subscriber, IST control for that call in the GMSC is terminated. The IST Alert timer that monitors the activity that initiated the IST Alert is restarted when no call termination indicator has been received in the IST Alert dialogue and the IST Alert

response received does not indicate termination of IST condition; the timer value shall be the same as in the previous count, or the new value received in the IST Alert response if any.

6.2.2 Call termination

The VMSC (current or previous) will inform the HLR about each of the remaining outgoing call activities (MO, CD, ECT and CF) of the subscriber with a IST Alert message. This message contains the IMSI of that subscriber. Each of the originating, deflected, transferred or forwarded calls for a specific subscriber can be terminated in the MSC by returning a call termination indicator from the HLR to the controlling MSC in response to the IST Alert message. The MSC shall then terminate the call activity that initiated the alert, or it may also terminate all call activities for that subscriber if these activities are linked in the MSC.

The GMSC will inform the HLR about each of the remaining incoming call activities (MT and CF) of the subscriber with a IST Alert message. This message contains the IMSI of that subscriber. Each of the terminating or forwarded calls for a specific subscriber can be terminated in the GMSC by returning a call termination indicator from the HLR to the controlling GMSC in response to the IST Alert message. The GMSC shall then terminate the call activity that initiated the alert, or it may also terminate all call activities for that subscriber if these activities are linked in the GMSC.

6.3 IST standalone mechanism

In addition to the periodic reporting mechanism, the IST standalone mechanism can optionally be supported in the HLR, the VMSC and the GMSC. This mechanism can be used to immediately terminate all outgoing subscriber activities in a VMSC and all incoming subscriber activities in the GMSC even when the subscriber is not under IST condition i.e. the MSC shall be able to terminate the call activities upon reception of the standalone IST command without having any previous IST subscriber settings defined.

Provided that the MSC/VLR supports IST standalone mechanism, the HLR may request the immediate disconnection of the outgoing calls by sending a MAP Cancel Location message to the current VLR, and afterwards the IST Command message to the current VMSC without waiting for an IST Alert message.

The HLR may also be able to request the immediate disconnection of outgoing call activities of a subscriber in previous VMSCs; for this purpose, the HLR may maintain a list of previous VMSCs with possibly remaining activities, to which the IST Command message may be sent without waiting for an IST Alert message. The mechanism used to maintain this list is out of the scope of this specification. The HLR may also be able to request the immediate disconnection of incoming call activities of a subscriber in any GMSC that may have requested routeing info from the HLR; for this purpose, the HLR may maintain a list of GMSCs with possibly remaining activities to which the IST Command message may be sent without waiting for an IST Alert message. The mechanism used to maintain this list is outside the scope of this specification.

The standalone IST Command is used in the MSC to terminate immediately all outgoing call activities for a subscriber. This is only possible if the MSC is able to link all the call activities for the same subscriber using the IMSI as key. Then, when a standalone IST command is received including the IMSI of the subscriber, the MSC can terminate all the outgoing call activities for that subscriber. If the MSC does not support IST standalone mechanism, it shall return an error in response to the HLR.

The standalone IST Command is used in the GMSC to terminate immediately all incoming call activities for a subscriber. This is only possible if the GMSC is able to link all the call activities for the same subscriber using the IMSI as key. Then, when a standalone IST Command is received including the IMSI of the subscriber, the GMSC can terminate all the incoming call activities for that subscriber. If the GMSC does not support IST standalone mechanism, it shall return an error in response to the HLR.

6.4 Exception procedure

The MSC/VLR shall inform the HLR about the support of IST function whenever a subscriber roams into that MSC/VLR area. Information about support of the IST standalone mechanism shall also be included. This information shall be included in the Update Location message sent to the HLR. The HLR can use the absence of any of these information to allow alternative actions in HLR in case of interworking with MSC/VLRs not supporting IST.

The alternative actions when the MSC/VLR does not support the IST function can be, as an operator option:

- Limit the service for the subscriber:

Activating temporarily an Operator Determined barring of Roaming, Incoming or outgoing calls.

- Allowing the service assuming associate risk of not having the IST mechanism available.

The GMSC shall inform the HLR about the support of IST function whenever it requests routeing information to establish a call. Information about support of the IST standalone mechanism shall also be included. This information shall be included in the Send Routeing Information message sent to the HLR. The HLR can use the absence of any of these information to allow alternative actions in HLR in case of interworking with GMSCs not supporting IST.

The alternative actions when the GMSC does not support the IST function can be, as an operator option:

- Limit the service for the subscriber:

  Activating temporarily an Operator Determined barring of incoming calls, deactivate temporarily the Call forwarding services invoked in the GMSC.

- Allowing the service assuming associate risk of not having the IST mechanism available.

Error responses from HLR are also part of the exception procedures. Whenever the error "Unknown Subscriber" is received from the HLR in response to an IST Alert message, the receiving entity (MSC or GMSC) shall terminate the call that initiated the alert procedure. Also, if the receiving entity is able to link the activities for that subscriber (outgoing call activities in the MSC and incoming call activities in the GMSC), it shall terminate all of them if an "Unknown Subscriber" error is received in response to any IST Alert message.

7 Control of IST

Definition of the method used by a PLMN to decide which subscribers to use IST upon is outside the scope of this specification. However, it is likely that the decision will be made by some sort of FDS within the PLMN. The interface between the FDS and the PLMN node that sends the IST Command message to the VPLMN (the CAMEL server for a CAMEL implementation of IST) is outside the scope of this specification.

Annex A (Informative): Change History

Change history								
Date	**TSG #**	**TSG Doc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**Old**	**New**
03-2001	SP-11	-	-	-	-	Upgrade to Release 4 (and 3GPP numbering)	03.35 v 8.0.0	43.035 v 4.0.0
03-2002	SP-15	SP-020113	001		A	IST implementation for non-CAMEL subscribers	4.0.0	4.1.0
Status of TS 23.035 (Created from TS 43.035 Release 4)								
06-2002	SP-16	-	-	-	-	Decision to transfer IST to 3GPP system specification set. References corrected to 3GPP specification references.	43.035 4.1.0	23.035 4.0.0
Status of TS 23.035 (Release 5)								
06-2002	SP-16	-	-	-	-	Upgrade to Release 5	4.0.0	5.0.0
09-2002	SP-17	SP-020509	003		A	Correction of use IST Command message and Call Termination Indication parameter	5.0.0	5.1.0
12-2004	SP-26	-	-	-	-	Upgrade to Release 6	5.0.0	6.0.0

History

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