ETSI EG 201 663 V1.2.2 (2000-02)

ETSI Guide

Intelligent Network (IN);
IN architecture and functionality for the support of
Cordless Terminal Mobility (CTM) Phase 2+;
Feature Package 2 (FP2) - Cordless Terminal Mobility (CTM)
Point-to-Point (PP) Point to point Short Message Service (SMS)

ETSI

Reference
DEG/NA-061304

Keywords
CTM, IN, interworking, SMS, supplementary
service

ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
Individual copies of this ETSI deliverable
can be downloaded from
http://www.etsi.org
If you find errors in the present document, send your
comment to: editor@etsi.fr

Important notice

This ETSI deliverable may be made available in more than one electronic version or in print. In any case of existing or
perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF).
In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network
drive within ETSI Secretariat.

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://www.etsi.org/ipr).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Network Aspects (NA).

1 Scope

The present document gives guidance on the network architecture and functionality to support a Point-Point Short Message Service (PP-SMS) feature to CTM users.

The network architecture and functionality to support CTM Phase 1 are described in EG 201 096-1 [3], EG 201 096-2 [4] and EG 201 096-3 [5] while enhancement to IN architecture and information flows for the support of CTM Phase 2 are described in EG 201 696 [6].

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.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1]   ETS 300 974: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification (GSM 09.02 version 5.14.0 Release 1996)".

[2]   ETS 300 901: "Digital cellular telecommunications system (Phase 2+); Technical realization of Short Message Service (SMS) Point-to-Point (PP) (GSM 03.40 version 5.8.1 Release 1996)".

[3]   EG 201 096-1: "Intelligent Network (IN); Cordless Terminal Mobility (CTM); IN architecture and functionality for the support of CTM; Part 1: CTM phase 1 for single public network case".

[4]   EG 201 096-2: "Intelligent Network (IN); Cordless Terminal Mobility (CTM); IN architecture and functionality for the support of CTM; Part 2: CTM interworking between public IN".

[5]   EG 201 096-3: "Intelligent Network (IN); Cordless Terminal Mobility (CTM); IN architecture and functionality for the support of CTM; Part 3: CTM interworking between private networks and public INs".

[6]   EG 201 696: "Intelligent Network (IN); IN architecture and functionality for the support of Cordless Terminal Mobility (CTM) phase 2".

[7]   CCITT Recommendation E.213: "Telephone and ISDN numbering plan for land mobile stations in public land mobile networks (PLMN)".

3   Definitions and abbreviations

3.1   Definition

The following definitions for SMS parameters have been taken from ETS 300 974 [1]:

msIsdn:	This parameter refers to one of the ISDN numbers assigned to a mobile subscriber in accordance with CCITT Recommendation E.213 [7].
sm-RP-PRI:	This parameter is used to indicate whether or not delivery of the short message shall be attempted when a service centre address is already contained in the Message Waiting Data file.
CTM no_t	This parameter indicates the CTM number of the terminating mobile.
CTM no_o	This parameter indicates the CTM number of the originating mobile.
ServiceCentreAddress:	This parameter represents the address of a Short Message Service Centre.
Sm-RP-UI:	This parameter represents the user data field carried by the short message service relay sub-layer protocol.
MoreMessagesToSend:	This parameter is used to indicate whether or not the service centre has more short messages to send.
MwStatus:	This parameter indicates whether or not the address of the originator service centre is already contained in the Message Waiting Data file. In addition, it contains the status of the Memory Capacity Exceeded Flag (MCEF) and the status of the Mobile subscriber Not Reachable Flag (MNRF).

3.2   Abbreviations

For the purposes of the present document, the following abbreviations apply:

CLI	Calling Line Identity
CTM	Cordless Terminal Mobility
CUSF	Call Unrelated Switch Function
GSM	Global System for Mobile communication
HLR	Home Location Register
INAP	Intelligent Network Application Protocol
IWF	InterWorking Function
MAP	Mobile Application Protocol
MCEF	Mobile Station Memory Capacity Exceeded Flag
MNRF	Mobile Not Reachable Flag
MWD	Message Waiting Data
PT	Portable Terminal
SCFmm	Service Control Function Mobility Management
SCFsl	Service Control Function Service Logic
SCUAF	Service Call Unrelated Agent Function
SDFmm	Service Data Function Mobility Management
SDFsl	Service Data Function Service Logic
SMS	Short Message Service
SMSC	Short Message Service Centre
VLR	Visited Location Register

4 CTM service requirements

In line with the HLR in GSM networks, the SDFsl needs to have some predefined data fields for CTM SMS parameters. The HLR contains (optional):

- Message Waiting Data (MWD):

    - MSIsdn-Alert;

    - SC address 1;

    - SC address 2;

    - …;

    - SC address n.

- Mobile Not Reachable Flag (MNRF);

- Mobile Station Memory Capacity Exceeded Flag (MCEF).

The VLR contains (optional):

- Mobile Not Reachable Flag (MNRF).

The case where MWD, MNRF and MCEF are not implemented in the HLR is also described in ETS 300 901 [2].

5 CTM SMS Functional Architecture

Clause 5 describes the architecture for the CTM SMS and covers these cases where the CTM user is in its home network or in a visited network. The implementation of CTM SMS should deliver the SMS with the same (or higher) QoS as for the GSM SMS.
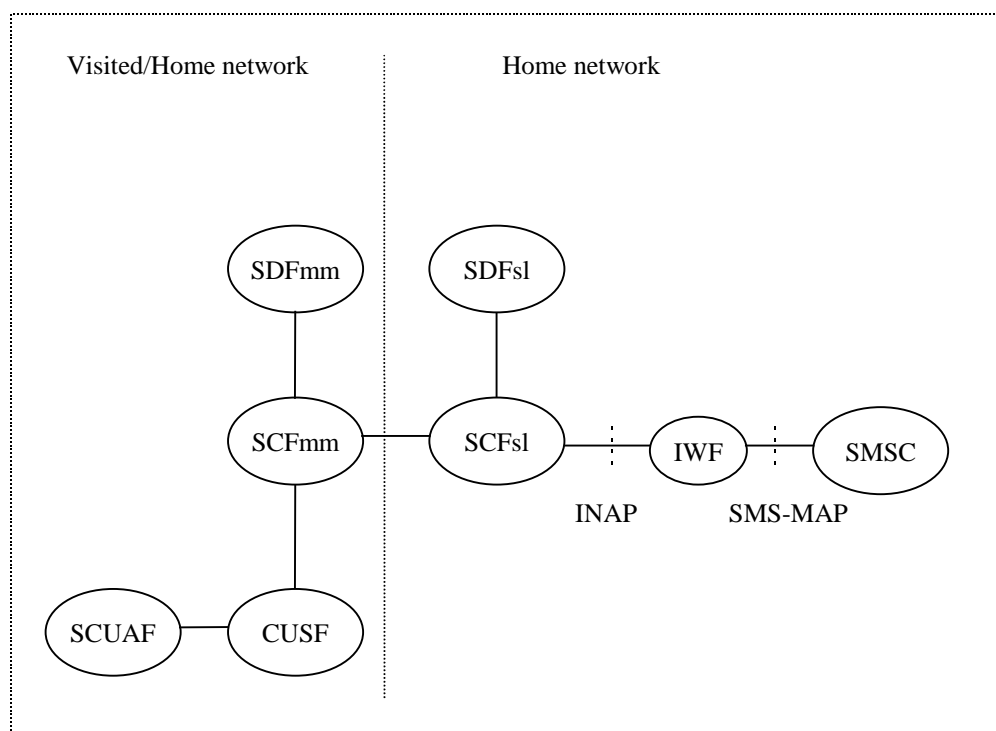

Figure 1: Architecture for call unrelated SMS in CTM

6 CTM SMS procedures and information flows

Clause 6 displays for each procedure information flows; the mapping of these flows to specific protocol messages is outside the scope of the present document.

The following procedures are relevant for the SMS service:

- Short Message CTM terminal originated (normal and exception procedure);

- Short Message CTM terminal terminated (normal and exception procedure);

- Short Message CTM delivery notification.

NOTE: In the present document the CTM SMS is defined following the GSM procedures (i. e. it is assumed that the terminals are able to store SMS messages).

6.1 Terminal originated CTM-SMS normal transfer procedure

In the CTM terminal originated case, a short message is sent from the CTM terminal (portable part) towards the short message service centre. This short message is sent along with the CTM number of the recipient, and possibly the CTM number of the originating terminal (CLI) in case the recipient should receive this information as in the GSM SMS service.
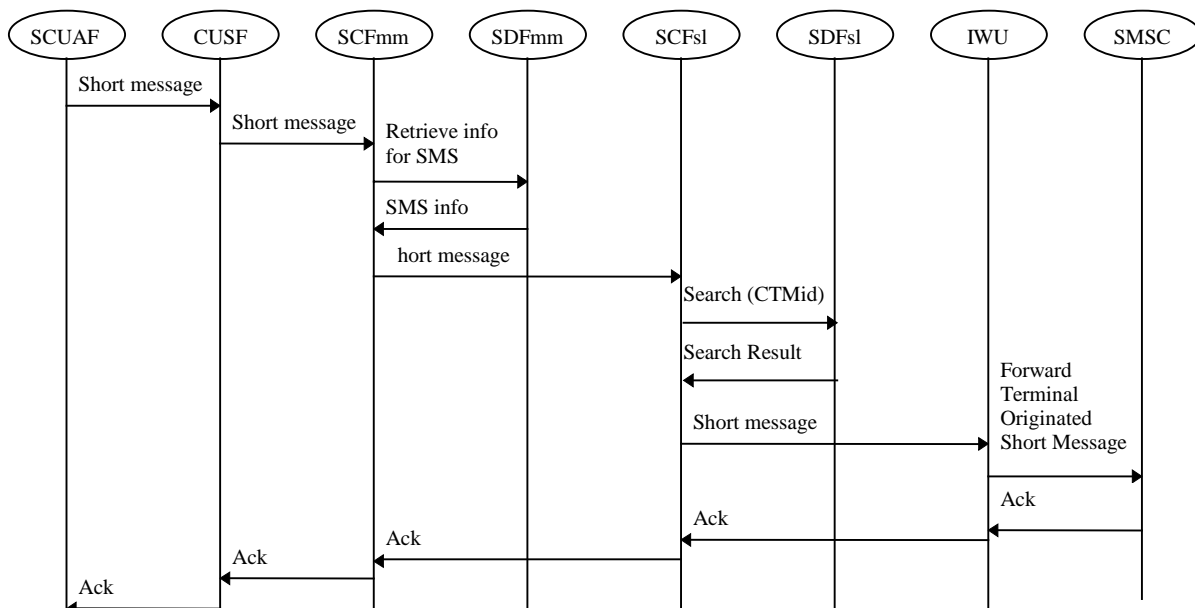
Figure 2: Terminal originated CTM short message transfer

Table 1

Information flow	Interface	Parameters needed
Short message	SCUAF-CUSF	CTM no_t CTMid ServiceCentreAddress sm-RP-UI
Short message	CUSF-SCFmm	CTM no_t CTMid ServiceCentreAddress sm-RP-UI
Retrieve info for SMS	SCFmm-SDFmm	CTMid
SMS info	SDFmm-SCFmm	SCFsl id (note 2)
Short message	SCFmm-SCFsl	CTM no_t CTM no_oh ServiceCentreAddress sm-RP-UI
Search	SCFsl-SDFsl	CTMid
Search Result	SDFsl-SCFsl	CTM no_t ServiceCentreAddress
Short message	SCFsl-IWU	CTM no_t CTM no_o ServiceCentreAddress sm-RP-UI
ForwardMOShortMessage	IWU-SMSC	msIsdn=CTM no_o ServiceCentreAddress sm-RP-UI

NOTE 1: In order to retrieve and check the SMS access rights of the user, when the user originates a CTM SMS procedure, the SCFsl queries the SDFsl.

NOTE 2: Another possibility could be to use serviceCentreAddress, and forward the short message directly to the IWU, and bypass the SCFsl.

6.2   Terminal terminated CTM-SMS normal transfer procedure

In the CTM terminal terminated case, a short message is sent from the short message service centre towards the CTM user. Also the ServiceCentreAddress is included in the transfer. The moreMessagesToSend information element allows for concatenation of SMS messages.
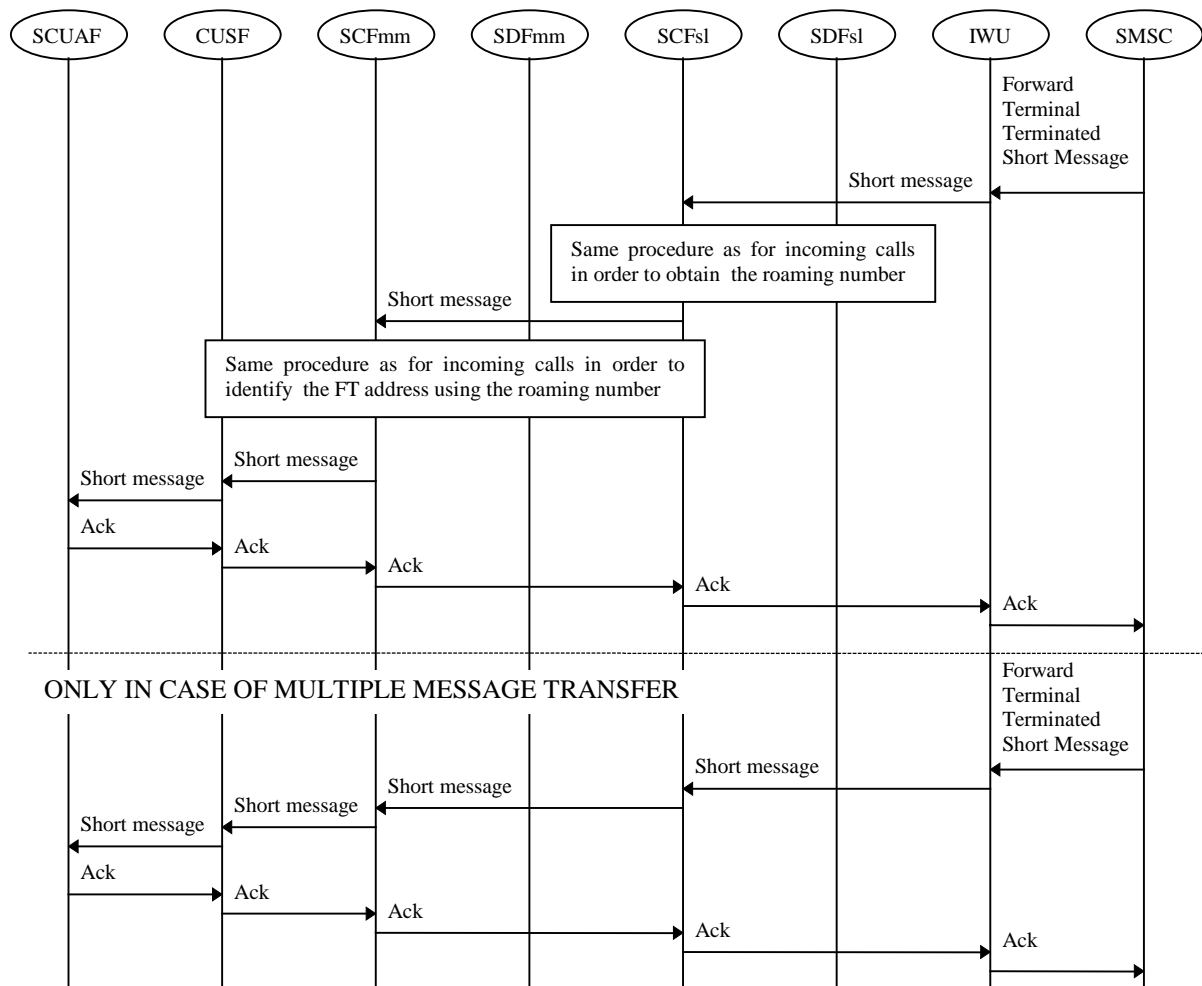

Figure 3: Terminal terminated CTM-SMS procedure - single and multiple short message transfer

Table 2

Information flow	Interface	Parameters needed
ForwardMTShortMessage	SMSC-IWU	msIsdn=CTMno_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	IWU-SCFsl	CTM no_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	SCFsl-SCFmm	CTM Id ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	SCFmm-CUSF	CTM Id FT address ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	CUSF-SCUAF	CTM Id ServiceCentreAddress sm-RP-UI moreMessagesToSend

6.3   Terminal originated CTM-SMS exception transfer procedure

The following information flows are for CTM terminal originated messages.
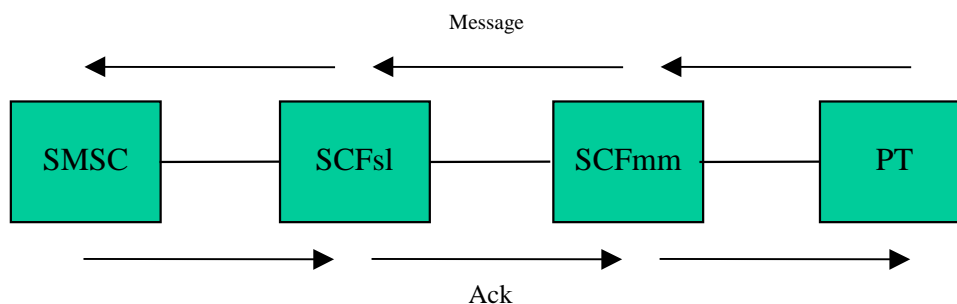

Figure 4: Generic flows for CTM terminal originated Message

For "normal" operation, the short message sent by the CTM terminal is received by the CTM SMSC and is checked for data accuracy. If correct, then an acknowledgement is sent by the SMSC to the CTM terminal to confirm receipt of the message.

Error handling procedures may happen in case of:

Defective transmission between the CTM terminal and the message centre

The SMSC receives the short message but detects that it is corrupted. The SMSC then reports the message failure to the originating CTM terminal. The terminal then informs the user of the message sending failure. The user would then have to resend the message.

Loss of transmission between the CTM terminal and the message centre

In this case, the SMSC does not receive any message (or insufficient to diagnose the sender) and is therefore unable to acknowledge the originating CTM terminal of the transmission failure. Expiring of a local timer in the terminal would initiate a message to the user to indicate that a message failure has occurred. The user would then have to resend the message.

Defective transmission between the message centre and the CTM terminal

The SMSC transmits the acknowledgement on receipt of the short message. The originating CTM terminal detects that the acknowledgement is corrupted and informs the user of the message sending failure. The user would then have to resend the message.

Loss of transmission between the message centre and the CTM terminal

As far as the user is concerned, this case is identical to the case described for loss of transmission between the CTM terminal and the message centre. However, the SMSC has received a correct short message which it would then deliver. If the user then resends the message, a duplicate message will be received by the SMSC and subsequently processed.

6.4   Terminal terminated CTM-SMS exception transfer procedure

6.4.1   Exception handling transfer procedure

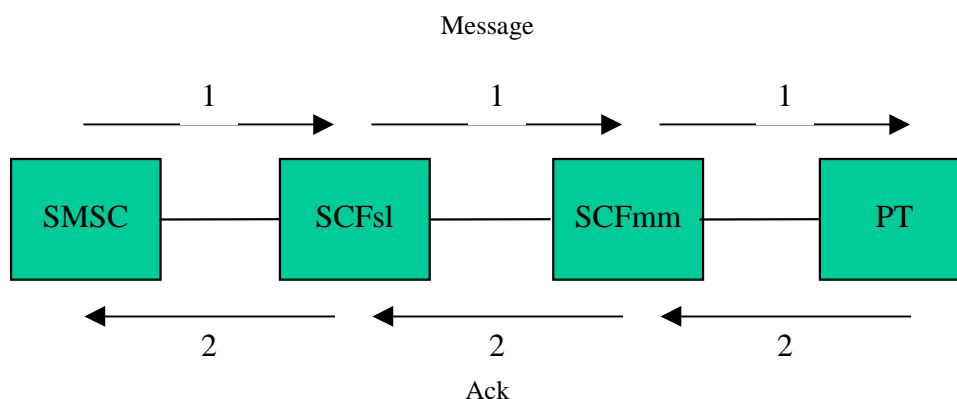The following information flows are for CTM terminal terminated messages.

Figure 5: Generic flows for CTM terminal terminated message

For "normal" operation, the short message sent by the CTM SMSC is received by the CTM terminal and is checked for data accuracy. If correct, then an acknowledgement is sent by the CTM terminal to the SMSC to confirm receipt of the message.

Error handling procedures may happen in case of:

Defective transmission between the message centre and the CTM terminal

The CTM terminal receives the short message but detects that it is corrupted. The CTM terminal then reports the message failure to the SMSC. The SMSC would then have to resend the message.

Loss of transmission between the message centre and the CTM terminal

In this case, the CTM terminal does not receive any message and is therefore unable to inform the SMSC of the transmission failure. After expiry of a timer in the SMSC, the SMSC would then have to resend the message.

Defective transmission between the CTM terminal and the message centre

The CTM terminal transmits the acknowledgement on receipt of the short message. The SMSC detects that the acknowledgement is corrupted and the SMSC would then resend the message. The terminating CTM terminal would receive a duplicate short message.

Loss of transmission between the CTM terminal and the message centre

As far as the user is concerned, this case is identical to the case described for loss of transmission between the SMSC and the CTM terminal. However, the CTM terminal has received a correct short message. The SMSC would then resend the message and the terminating CTM terminal would receive a duplicate short message.

6.4.2   Exception handling terminal not reachable

6.4.2.1   Terminal terminated CTM-SMS transfer attempt on terminal not reachable
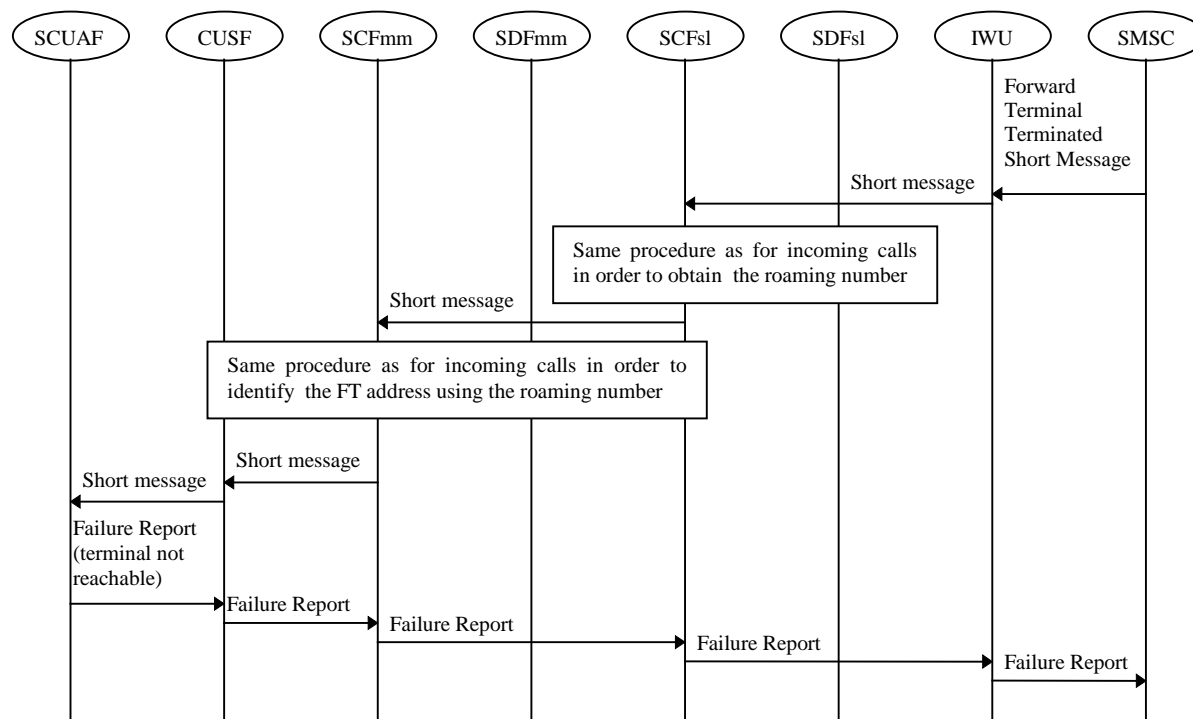

Figure 6: Terminal terminated CTM-SMS transfer attempt on terminal not reachable

Table 3

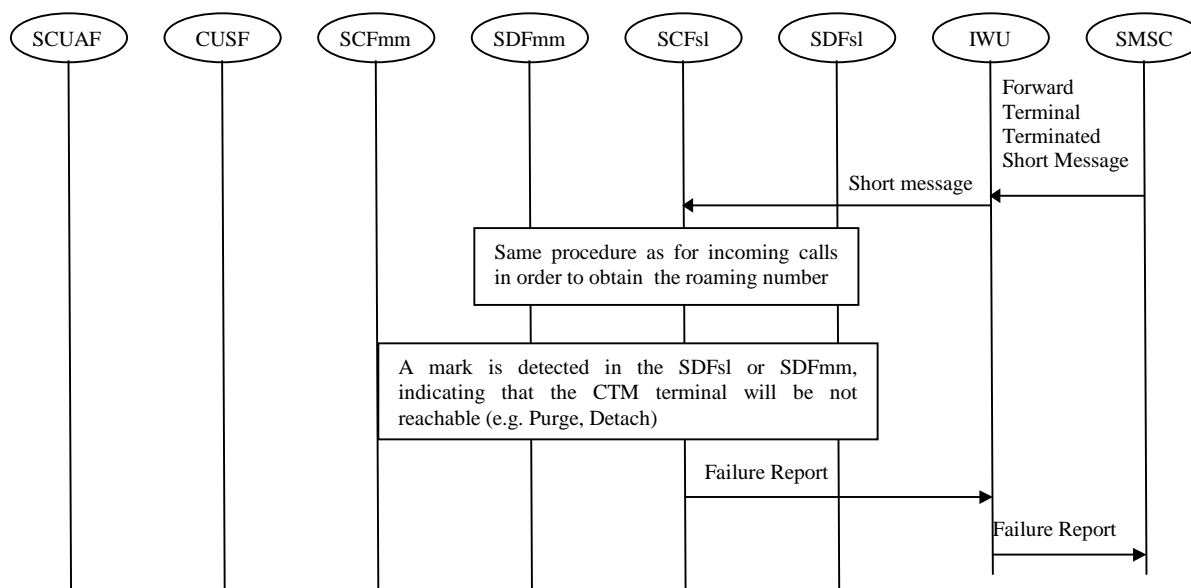| Information flow	Interface	Parameters needed
ForwardMTShortMessage	SMSC-IWU	msIsdn=CTMno_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	IWU-SCFsl	CTM no_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	SCFsl-SCFmm	CTM Id ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	SCFmm-CUSF	CTM Id FT address ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	CUSF-SCUAF	CTM Id ServiceCentreAddress sm-RP-UI moreMessagesToSend

Figure 7: Terminal terminated CTM-SMS transfer attempt failing due to negative outcome of SDFsl or SDFmm information retrieval

Table 4

Information flow	Interface	Parameters needed
ForwardMTShortMessage	SMSC-IWU	msIsdn=CTMno_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	IWU-SCFsl	CTM no_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend

6.4.2.2 CTM-SMS alert procedure initiated by the network (CTM terminal is present)

The "alert" and "update subscriber info" is a result of a Location Registration Procedure, and will not be treated here. After a successful Location Registration Procedure, the service centres are notified that the CTM terminal is attached to the network.

The location registration procedure is used to load the PT over the air with certain identities, and to make the PT known to the network. The PT can use the data to gain access to the network and to make calls, and to recognize the system to receive calls. The network can use the information to validate service requests from the PT, and to route calls to valid PTs.

This applies also to SMS. Once the user/PT is made known to the network for calls, the same is processed for SMS.
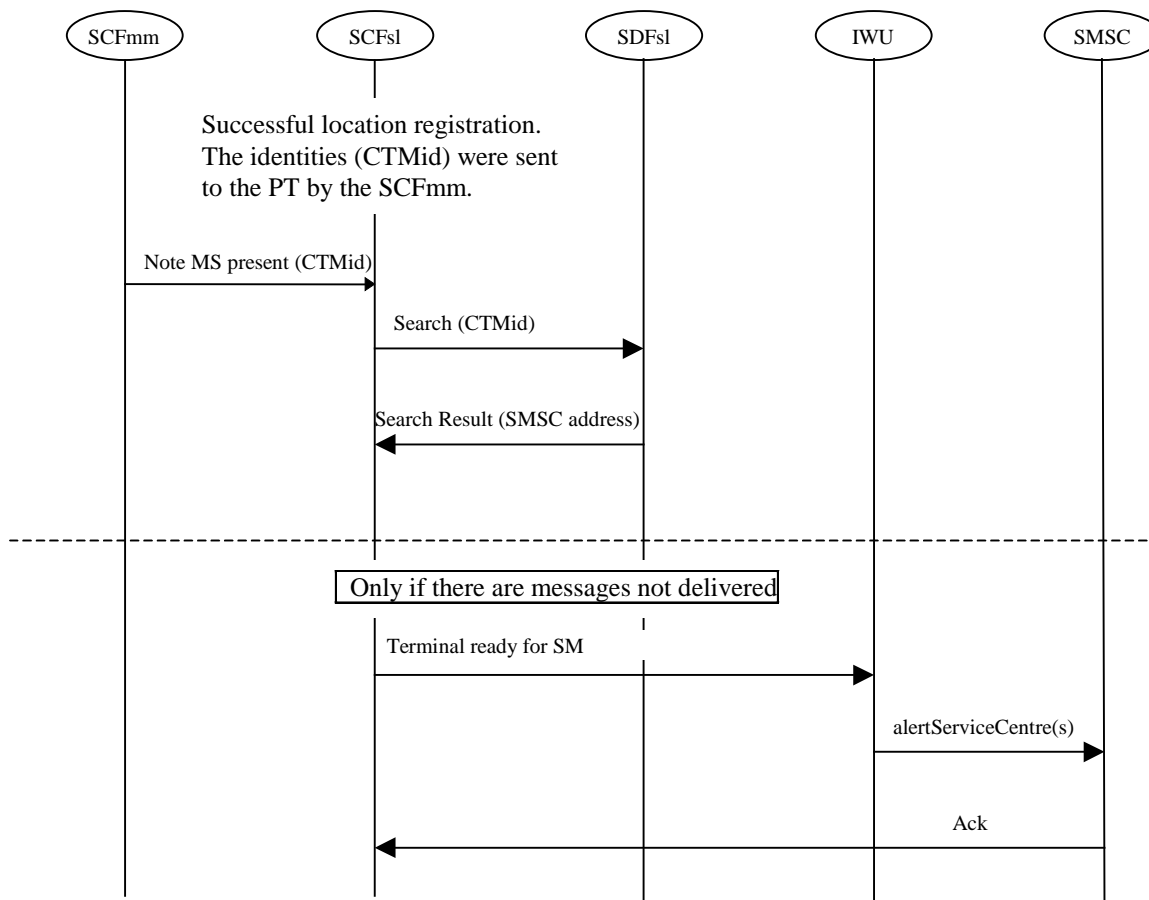

Figure 8: CTM-SMS alert procedure (CTM terminal is present)

Table 5

Information flow	Interface	Parameters needed
Request for SMSC alerting	SCFmm-SCFsl	CTMid
Search	SCFsl-SDFsl	CTMid
Search Result	SDFsl-SCFsl	CTM no_t ServiceCentreAddresses
Terminal ready for SM	SCFsl-IWU	CTM no_t ServiceCentreAddress
AlertServiceCentre	IWU-SMSC	MsIsdn ServiceCentreAddress

NOTE 1: In case of multiple SMSCs, last two flows will be repeated as many times as the SMSC number.

NOTE 2: The information about any previous unsuccessful messages not delivered to the PT is available in the SDFsl.

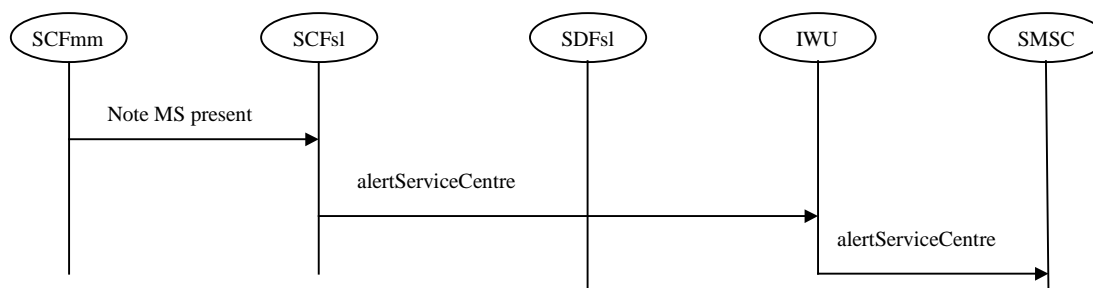NOTE 3: The first flow is present only in case of alert procedure initiated by the SCFmm.

Figure 9: CTM-SMS alert procedure when the CTM terminal becomes reachable

Table 6

Information flow	Interface	Parameters needed
NoteMSpresent	SCFmm-SCFsl	CTMid
alertServiceCentre	IWU-SMSC	MsIsdn ServiceCentreAddress

6.4.3 Exception handling memory not available

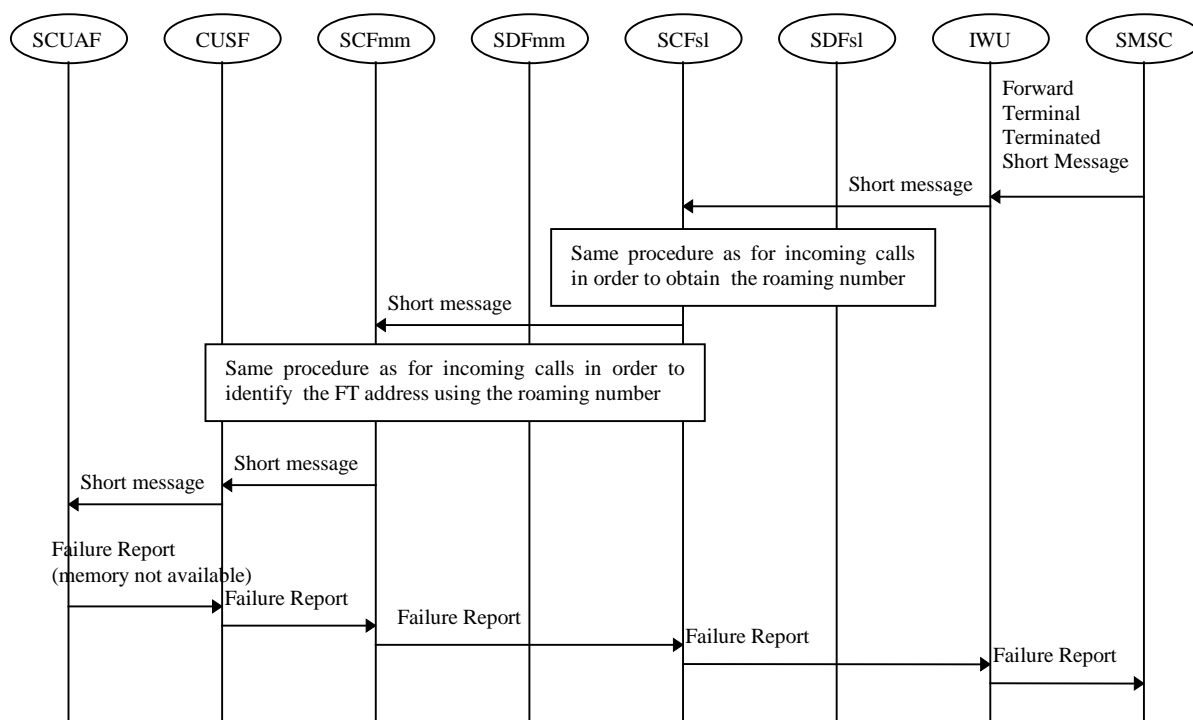### 6.4.3.1 Terminal terminated CTM-SMS transfer attempt on memory not available

Figure 10: Terminal terminated CTM-SMS transfer attempt on memory not available

Table 7

Information flow	Interface	Parameters needed
ForwardMTShortMessage	SMSC-IWU	msIsdn=CTMno_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	IWU-SCFsl	CTM no_t sm-RP-PRI ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	SCFsl-SCFmm	CTM Id ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	SCFmm-CUSF	CTM Id FT address ServiceCentreAddress sm-RP-UI moreMessagesToSend
Short message	CUSF-SCUAF	CTM Id ServiceCentreAddress sm-RP-UI moreMessagesToSend

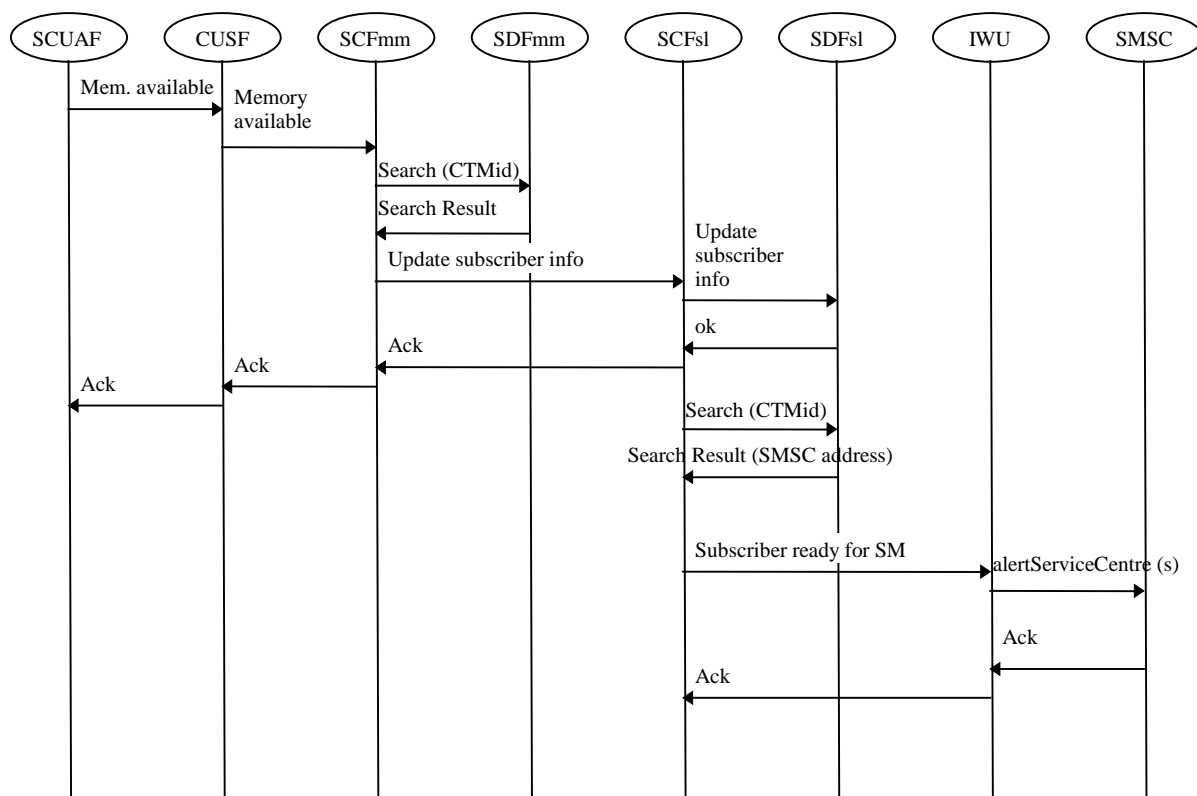### 6.4.3.2   CTM-SMS alert procedure initiated by the PT (memory available)

Figure 11: Short message alert procedure (CTM terminal memory capacity available)

Table 8

Information flow	Interface	Parameters needed
Search	SCFmm-SDFmm	CTM id
Search Result	SDFmm-SCFmm	SCFsl id
Update subscriber info	SCFmm-SCFsl	CTM id MwStatus
Update subscriber info	SCFsl-SDFsl	CTM id MwStatus
Search	SCFsl-SDFsl	CTMid
Search Result	SDFsl-SCFsl	CTM no_o ServiceCentreAddresses
Subscriber ready for SM	SCFsl-IWU	CTM no_o ServiceCentreAddress
alertServiceCentre	IWU-SMSC	MsIsdn ServiceCentreAddress

NOTE 1: In the case of multiple SMSCs, the last two flows will be repeated as many times as the SMSC number.

NOTE 2: In this case there are some (at least one) previous unsuccessful messages not delivered because of the PT's previous memory full state.

6.5   CTM-SMS delivery notification

In this case, the user originating the short message can request a delivery report showing that the short message has been delivered to the terminating terminal.
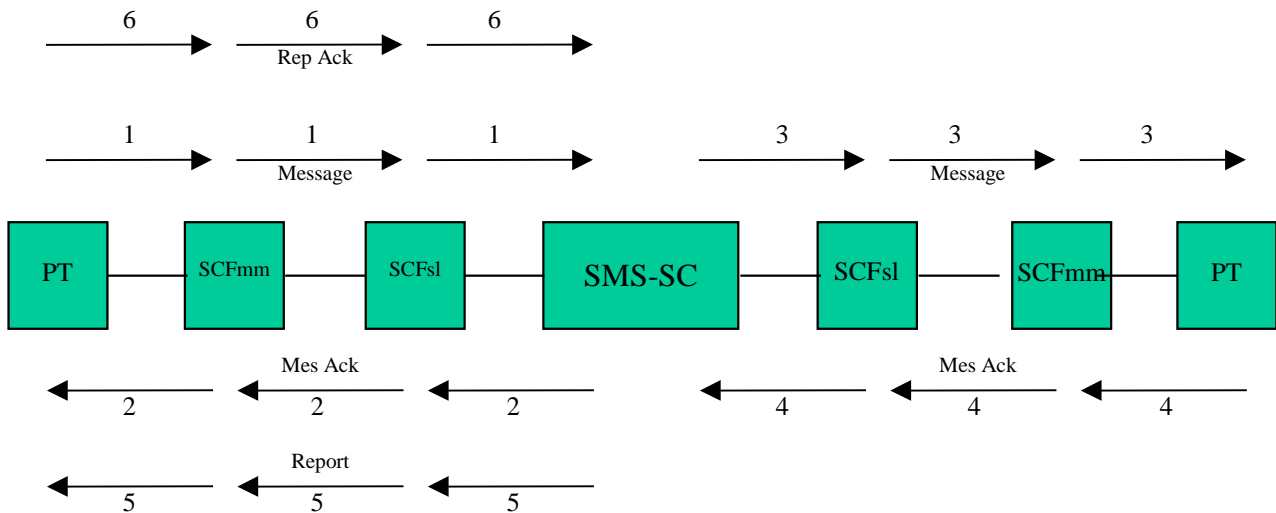

Figure 12: CTM-SMS delivery notification

It is evident that the error analysis proposed for the SMS delivery can be extended to include the delivery report handshaking.

7   Interworking scenarios

No additional functionality is required by CTM SMS standard to interworking with GSM networks and Internet electronic mail.

History

Document history			
V1.2.1	November 1999	Membership Approval Procedure	MV 200004: 1999-11-30 to 2000-01-28
V1.2.2	February 2000	Publication	