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*Technical Specification*

**Universal Mobile Telecommunications System (UMTS);
LTE;
Support of Short Message Service (SMS)
over generic 3GPP Internet Protocol (IP) access;
Stage 2
(3GPP TS 23.204 version 7.6.0 Release 7)**

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# Foreword

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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:

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# Introduction

The Short Message Service (SMS) has  have enjoyed great success in cellular networks. At the same time, specifications have been and are being developed for extending 3GPP services to non-cellular IP Connectivity Access Networks (IP-CANs). In this same spirit, this specification describes the capabilities needed to support SMS for generic IP-CANs.

SMS over generic IP access can be used to support applications and services that use SMS when a generic IP access is used.

# 1    Scope

The present document specifies the new capabilities and enhancements needed to support SMS over a generic IP Connectivity Access Network (IP-CAN) using IMS capabilities (TS 23.228 [9]). These include (but are not limited) to:

1    Enhancements to the HSS;

2     Communication between the SMS-GMSC/SMS-IWMSC and the HSS;

3    Authentication of service usage and registration;

4    Transfer of Mobile Terminated SMS, Mobile Originated SMS, and Delivery reports;

5    Mechanisms to handle SMS when there is more than one IP connection active with the mobile, etc.

# 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: "Vocabulary for 3GPP Specifications".

[2]            3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) Point to Point (PP)".

[3]            Void.

[4]            Void.

[5]            Void.

[6]            3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[7]            Void.

[8]            Void.

[9]            3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[10]           Void.

[11]           Void.

# 3    Definitions, symbols and abbreviations

## 3.1    Definitions

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

**IMS core:** Refers to the core session control elements of the IM CN Subsystem, i.e. the CSCFs, and the IBCF.

## 3.3 Abbreviations

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

IP-SM-GW IP-Short-Message-Gateway

# 4 Void

# 4a Architecture Requirements

The SMS-IP architecture shall allow for the following:

- a registration and de-registration mechanism shall be supported where UEs are required to explicitly indicate their ability to send and receive SMS over IP messages.

- provide for the transport of Short Message Service TP layer PDUs (TS 23.040 [2]) and associated RP layer information.

- Notification to be sent to the HSS that a previously unreachable UE is now reachable.

# 5 Architecture model and reference points

## 5.1 Reference architecture

Figure 5.1 below shows the overall architecture for providing SMS over a generic IP CAN.



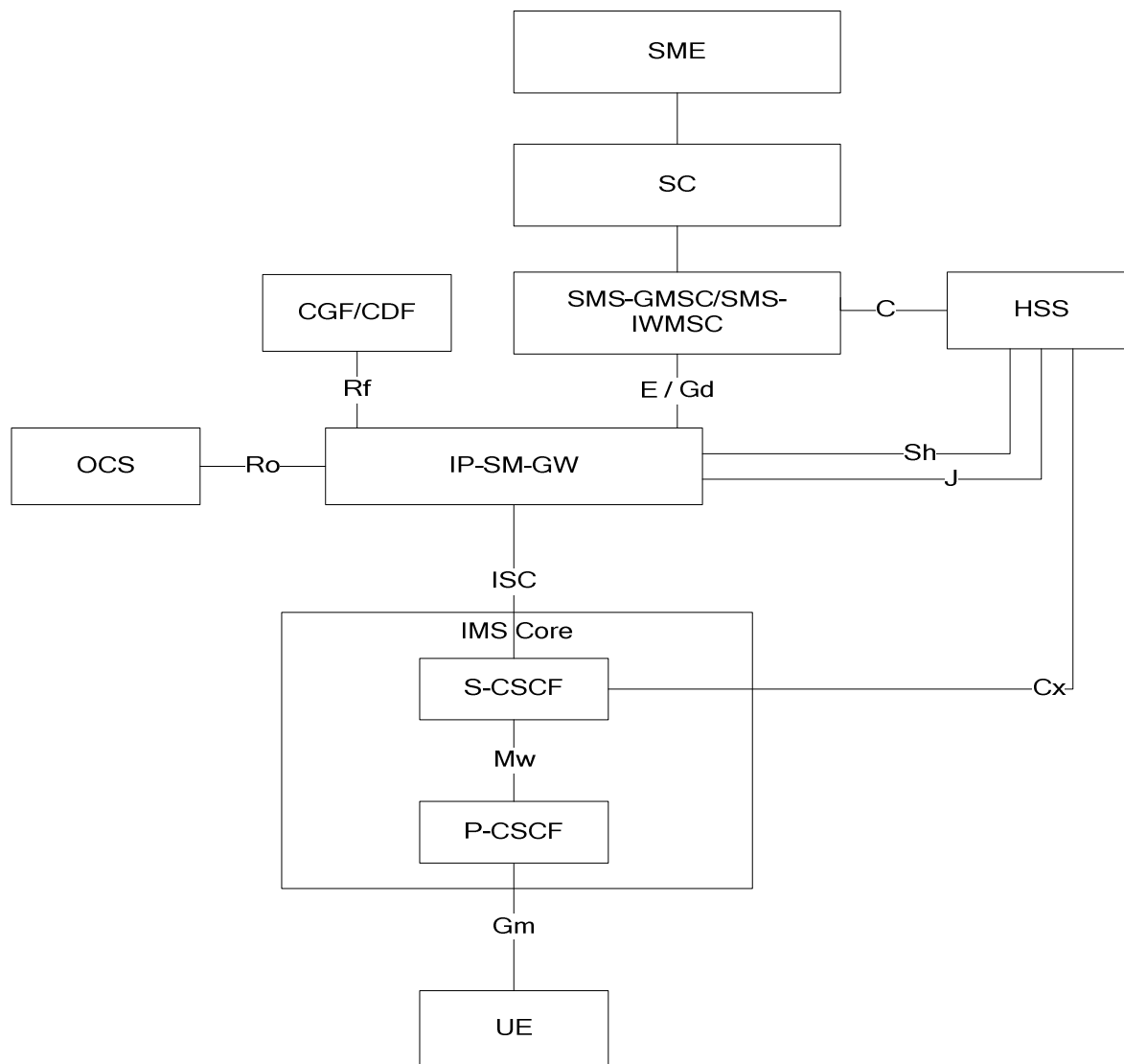**Figure 5.1: Architecture for providing SMS over a generic IP-CAN**

## 5.2 Reference points

### 5.2.1 General

The sub-sections below describe the needed enhancements and specific considerations to existing interfaces in order to support SMS over a generic IP-CAN.

### 5.2.2 C interface

The C interface allows the SMS-GMSC, using MAP, to obtain the address of the IP-Message-GW via mechanisms described in clause 5.3.

## 5.2.3 Interface between the IP-SM-GW and the HLR/HSS

The interface(s) between the IP-SM-GW and the HLR/HSS is used for:

- Supporting the registration and de-registration from the IP-SM-GW to the HLR/HSS for SMS delivery.

- Forwarding of the Send Routeing Information for Short Message requests from HLR/HSS to IP-SM-GW in order to return the address where the SM should be forwarded.

- Interrogating the HLR/HSS using Send Routeing Information for Short Message to retrieve the IMSI and the current MSC and/or SGSN addresses.

- Informing the HLR/HSS when a memory capacity exceeded condition ceases.

- Retrieving SMS related data from the HLR/HSS: subscriber data of the short message service similar to the data for the current CS/PS domain and additional service data on the service authorisation of the encapsulated short message delivery via IMS.

Both the J and a Sh interface can be deployed between the IP-SM-GW and the HLR/HSS. During the functional allocation the change on existing MAP functions should be minimized. The deployment of the J interface is mandatory, since it is used for forwarding the SRI for SM MAP message.

## 5.2.4 E/Gd interface

The E/Gd interface allows the IP-SM-GW to connect to the SMS-GMSC using MAP, appearing to the SMS-GMSC as an MSC or SGSN.

## 5.2.5 ISC interface

The ISC interface allows the IP-SM-GW to forward the receiving message to the SIP based UE via IMS core.

## 5.2.6 Void

## 5.3 Functional entities

## 5.3.1 IP-Short-Message-Gateway (IP-SM-GW)

The IP-SM-GW shall provide the protocol interworking for delivery of the short message between the IP-based UE and the SC. The message is routed to the SC for delivery to the SMS-based user or the message is received from the SC of an SMS-based UE for delivery to an IP-based UE.

The general functions of the IP-SM-GW are:

- to determine the domain (CS/PS or IMS) for delivery of an SMS message;

- to connect to the SMS-GMSC using established MAP protocols, appearing to the SMS-GMSC as an MSC or SGSN using the E or Gd interfaces;

- to respond to Send Routeing Information for Short Message requests made by the SMS-GMSC, and forwarded from the HSS, with its own address;

- to connect to the SMS-IWMSC using established MAP protocols, appearing to the SMS-IWMSC as an MSC or SGSN using the E or Gd interfaces;

- to connect to the HSS using established MAP protocols , to obtain the address of MSC/SGSN address(es) for MT delivery of SMS message in CS/PS;

  NOTE 1: The IP-SM-GW need not support all of the functionality defined in MAP in TS 29.002 [6].

- to acquire and maintain knowledge of the association between the MSISDN, IMSI and the address of the S-CSCF serving of the user;

- to check that it has a valid address in SMS for the sender as well as the recipient when receiving an IMS message for an SMS user. The IP-SM-GW shall obtain a valid address for both from the SIP headers of the IMS message (e.g. the sender would be identified in the asserted id in form of TEL URI);

- for terminating procedures, to map the recipient"s address from an MSISDN/IMSI to TEL URI format when receiving an SMS for an IP-based UE, and then it is the responsibility of the IMS core to perform any further mapping towards a SIP URI as required;

- to act as an Application Server towards the IMS core;

- to perform domain selection to choose the appropriate domain to deliver a message to a recipient and to obtain the MSC and/or SGSN addresses from the HSS; and

- to manage flags indicating user availability for SMS termination in the HSS.

The additional functions of the IP-SM-GW when interworking is done by carrying encapsulated SMS messages in IMS messages are:

- to communicate with the UE using IMS messaging as transport while maintaining the format and functionality of the SMS message;

- to carry the SMS status messages as encapsulated bodies of IMS messages;

- to store the subscriber data of  the short message service similar to the data for the current CS/PS domain and to perform the short message authorization as performed by the MSC/SGSN, as well as to store additional service data on the service authorisation of the encapsulated short message delivery via IMS and to perform the service authorization.

NOTE 2: The short message subscriber data of the CS/PS domain and additional service data on the authorisation of encapsulated short message delivery via IMS are retrieved from the HLR/HSS via third party registration procedure as specified in the clause 6.1. The IP-SM-GW can request the HSS to send a notification whenever the subscriber data and/or additional service data is updated, which the IP-SM-GW can then retrieve.

NOTE 3: The mechanism for prioritizing whether the short message is delivered via a GSM/UMTS or other IP-CAN connection when the terminal is simultaneously connected to both access networks is outside the scope of this specification.

## 5.3.2   HSS

In order to support SMS over generic IP access, the HSS shall support the following functions:

- storing the pre-configured address of the IP-SM-GW on a subscriber basis;

NOTE:    If all subscribers are assigned to a single IP-SM-GW address, the IP-SM-GW address does not need to be pre-configured in the HSS.

- handling an indication that the terminal is registered with an IP-SM-GW for delivery of SMS;

- responding to the "send routing information for short message" query from IP-SM-GW with the address of the MSC/SGSN;

- forwarding the Send Routeing Information for Short Message, from an SMS-GMSC, towards the IP-SM-GW and forwarding any responses to the originator of the Send Routeing Information for Short Message;

- returning the IMSI and the MSC and/or SGSN addresses as a response to Send Routeing Information for Short Message required from IP-SM-GW;

- alerting the SCs stored in the message waiting data when the terminal is registered with an IP-SM-GW for delivery of short message; and

- accepting delivery status reports from IP-SM-GWs instead of SMS-GMSC.

# 6 Procedures

## 6.1 Registration procedure



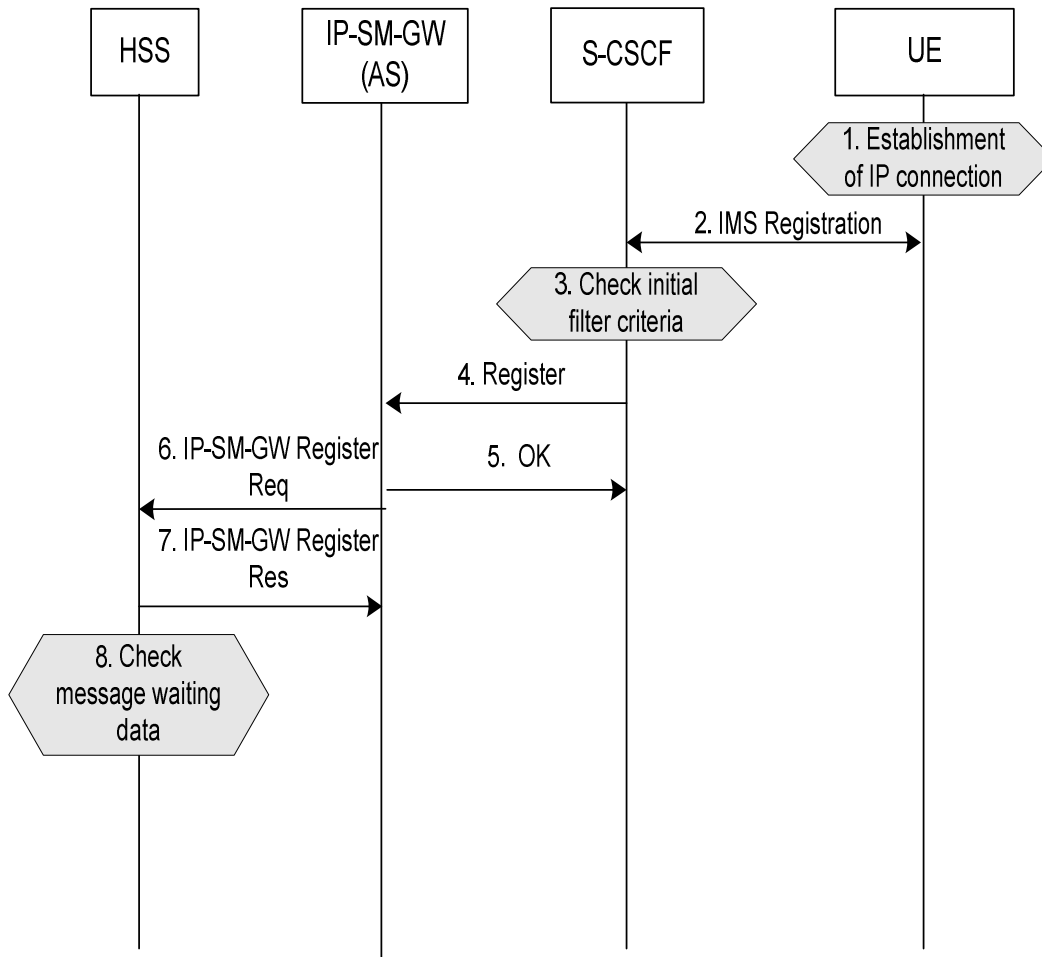**Figure 6.1: Registration procedure**

1) The UE establishes IP connection.

2) At any time after the establishment of the IP connection, the UE registers at the S-CSCF according to the IMS registration procedures. Note, that for simplicity not all messages between UE and S-CSCF and between S-CSCF and HSS are shown in detail. In addition, I-CSCF and P-CSCF are also not shown.

3) S-CSCF checks the initial filter criteria retrieved from the HSS during the IMS registration procedure.

4) After successful IMS registration and based on the retrieved initial filter criteria the S-CSCF informs the IP-SM-GW (AS) about the registration of the user.

5) The IP-SM-GW (AS) returns OK to the S-CSCF.

6) The IP-SM-GW (AS) sends IP-SM-GW Register Req to the HSS.

7) The HSS stores the received information if necessary, uses it as an indication that the UE is available to be accessed via the IMS to trigger an alert message if the message waiting flag is set, and responses to the IP-SM-GW (AS) with IP-SM-GW Register Res.

NOTE: In order to keep a consistent service experience, the IP-SM-GW address stored in the HSS via registration procedure shall be the same as the preconfigured IP-SM-GW address.

8) After successful registration of the IP-SM-GW address at the HSS the HSS checks whether message waiting data are stored and alerts all SCs using procedures described in TS 23.040 [2] (see also clause 6.5b).

# 6.2 De-registration procedure
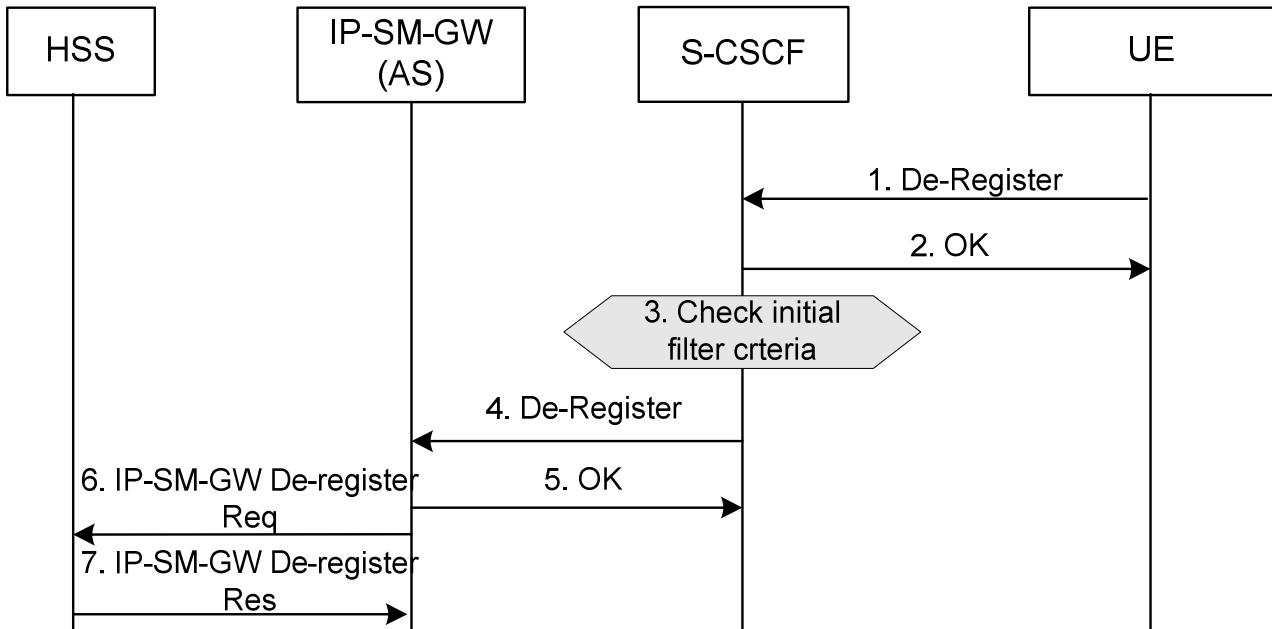
## 6.2.1 UE initiated



**Figure 6.2: UE initiated de-registration procedure**

1) At any time after the registration procedure, the UE may initiate a de-registration procedure. The UE sends a De-Register request (Register request with Expires header having value 0) to the S-CSCF.

NOTE 1: The I-CSCF and P-CSCF are not shown in this figure.

2) S-CSCF responds to the UE with a 200 OK.

3) S-CSCF checks the initial filter criteria retrieved from the HSS during the IMS registration procedure.

4) Based on initial filter criteria the S-CSCF informs the IP-SM-GW (AS) about the de-registration of the user.

5) The IP-SM-GW (AS) returns OK to the S-CSCF.

6) The IP-SM-GW (AS) de-registers the UE at the HSS sending a De-register Req.

7) The HSS de-registers the UE, and responds to the IP-SM-GW (AS) with De-register Res.

NOTE 2: The pre-configured IP-SM-GW address in the HSS, if any, is not removed, as it is used for subsequent SM MT routeing.
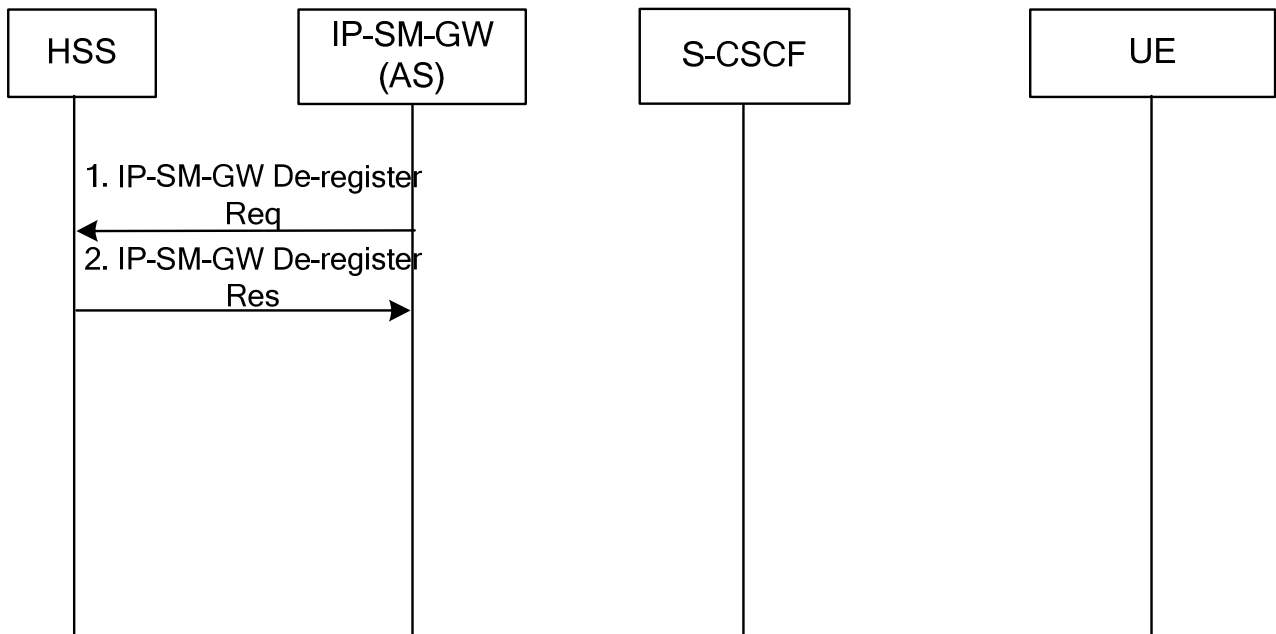
## 6.2.2 Network initiated



**Figure 6.2a: Network initiated de-registration procedure**

1) After receiving a trigger (e.g. De-Register message from the S-CSCF), the IP-SM-GW shall De-Register the IP-SM-GW of a subscriber from the HSS sending a De-Register Req.

2) The HSS de-registers the UE and responds to the IP-SM-GW (AS) with De-register Res.
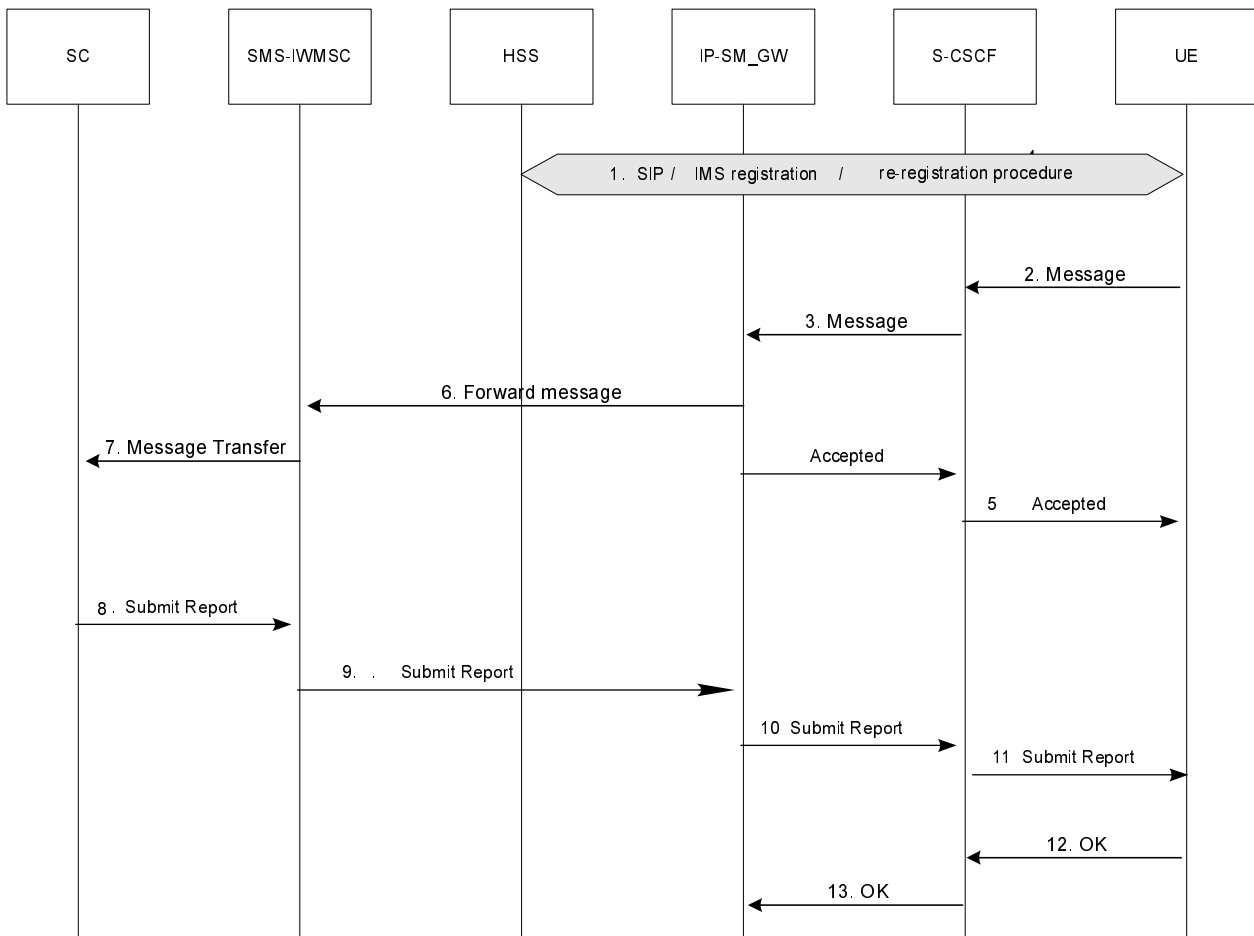
## 6.3 Successful SMS MO submit procedure



**Figure 6.3: Successful SMS MO submit procedure**

1) The UE registers to S-CSCF according the IMS registration procedure. Note that I-CSCF and P-CSCF are not shown in this figure.

2) UE submits the SMS message (SMS-SUBMIT, SC Address) to the S-CSCF using an appropriate SIP method.

3) S-CSCF forwards the Message (SMS- SUBMIT, SC Address) to IP-SM-GW (AS) based on stored iFC.

NOTE:      Subscribers who have no subscription for SMS service will be provided with the relevant iFCs, to provide SMS filtering/blocking.

4) IP-SM-GW (AS) acknowledges the SIP message.

5) SIP message acknowledge is forwarded by S-CSCF to UE.

6) The IP-SM-GW performs service authorization based on the stored subscriber data as described in the clause 6.1. The IP-SM-GW shall check whether the subscriber is authorised to use the short message service (e.g. Operator Determined Barring settings), similar to the authorization performed by MSC/SGSN in case the short message is delivered via CS or PS domain. In addition, the IP-SM-GW shall also check whether the user is authorised to use the encapsulated short message delivery via IMS. If the result of service authorization is negative, the IP-SM-GW shall not forward the message, and shall return the appropriate error information to the UE in a failure report. Otherwise, the IP-SM-GW (AS) extracts the SMS message (SMS- SUBMIT) and forwards it towards SC (SC Address) via the SMS-IWMSC using standard MAP signalling (as described in TS 23.040 [2]).

7) The SMS-IWMSC forwards the SMS message (SMS- SUBMIT) to the SC (see TS 23.040 [2]).

8) SC sends SUBMIT-REPORT to SMS-IWMSC (see TS 23.040 [2]).

9) SMS-IWMSC sends SUBMIT-REPORT to IP-SM-GW (AS) (see TS 23.040 [2]).

10) IP-SM-GW (AS) sends SUBMIT-REPORT to S-CSCF, using an appropriate SIP method.

11) S-CSCF sends the SUBMIT-REPORT to the UE.

12) UE acknowledges the SUBMIT-REPORT.

13) Acknowledgement of the SUBMIT-REPORT is forwarded by S-CSCF to IP-SM-GW (AS).

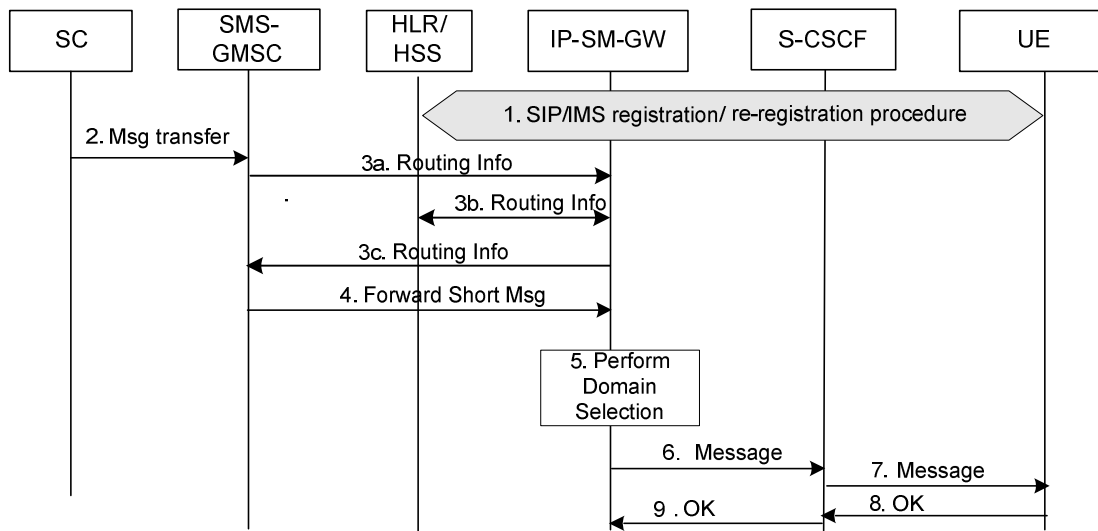# 6.4 Successful SMS MT delivery procedure



**Figure 6.4: Successful SMS MT delivery procedure**

1) The UE registers to the S-CSCF according to the IMS registration procedure.

NOTE 1: The I-CSCF and P-CSCF are not shown in this figure.

2) The SC forwards the SMS message (SMS-DELIVER) to the SMS-GMSC.

3a) The SMS-GMSC interrogates the HSS to retrieve routeing information. Based on the pre-configured IP-SM-GW address for the user, the HSS forwards the request to the corresponding IP-SM-GW.

NOTE 2: The Send Routeing Info for SM request is not forwarded if it has been sent originally from the IP-SM-GW.

NOTE 3: If there is only a single IP-SM-GW address, the IP SM GW address does not need to be pre-configured in the HSS, the Send Routeing Info for SM request can be forwarded on the STP level.

3b) The HLR/HSS returns the addresses of the current MSC, SGSN to the IP-SM-GW for delivery of the SMS in CS/PS domain. The HLR/HSS also returns the IMSI, for the IP-SM-GW to correlate the receipt of SMS from the correlation identifier within the IMSI field of the Forward Short Message.

3c) The IP SM GW creates a correlation identifier as per TS 23.040 [2] which associates the SRI for SM with the subsequent Forward SM messages(s), and stores this along with the IMSI of the receiving subscriber. The IP-SM-GW returns the address of itself, along with the correlation identifier, as routeing information to SMS-GMSC.

NOTE 4: For the case the IP-SM-GW address is not pre-configured in the HSS, the Send Routeing Info for SM request will be forwarded on the STP level, the IP-SM-GW returns the address of itself as routeing information to SMS-GMSC upon receipt of the forwarded Send Routeing info for SM request.

4) SMS-GMSC delivers the short message (SMS-DELIVER) to IP-SM-GW (AS) including the correlation identifier received from the IP-SM-GW, in the same manner that it delivers the short message to an MSC or SGSN.

5) The IP-SM-GW performs service authorization based on the stored subscriber data described in the clause 6.1. The IP-SM-GW shall check whether the subscriber is authorised to use the short message service (e.g. Operator Determined Barring settings), similar to the authorization performed by MSC/SGSN in case the short message is delivered via CS or PS domain. In addition, the IP-SM-GW shall also check whether the subscriber is authorised to use the encapsulated short message delivery via IMS. If the result of service authorization is negative, the IP-SM-GW shall not forward the message, and shall return the appropriate error information to the SC in a Failure Report. Otherwise, the IP-SM-GW performs domain selection function to determine the preferred domain for delivering the message according to operator policy and user preferences. The logic for selecting preferred route for message delivery is a matter of implementation.

6) If the preferred domain is IMS, the IP-SM-GW (AS) uses the TEL-URI associated with the IMSI of the message received for the target UE to send the short message (SMS-DELIVER, SC Address) using the appropriate SIP method towards the S-CSCF.

7) S-CSCF forwards the Message (SMS-DELIVER, SC Address) to the UE.

8) The UE responds with a OK to the S-CSCF

NOTE 5: This is not yet the Delivery report.

9) S-CSCF responds with a OK to IP-SM-GW (AS).
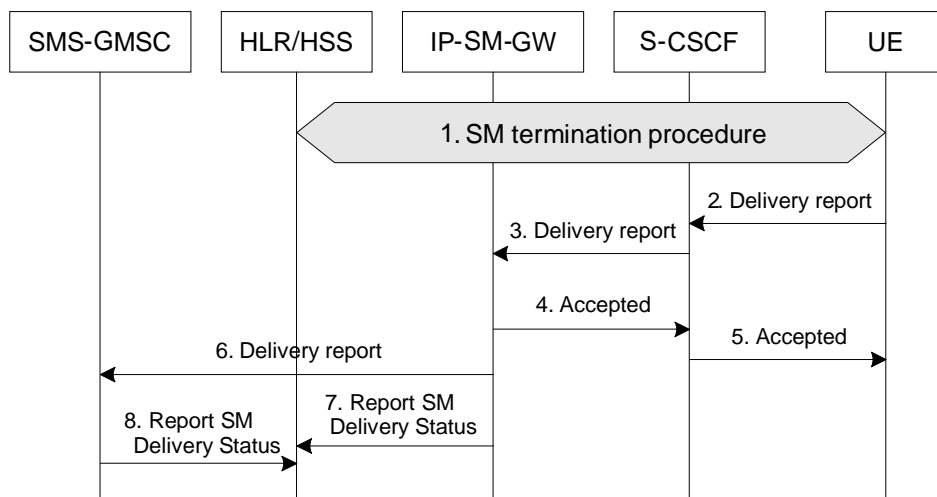
# 6.5 Delivery Report procedure



**Figure 6.5: Delivery report procedure**

1) The UE has received the short message as described in clause 6.4.

2) The UE sends a SMS-DELIVERY-REPORT to the S-CSCF, including either a positive or a negative acknowledgement to the short message received in step 1.

3) The S-CSCF forwards the SMS-DELIVERY-REPORT to the IP-SM-GW (AS). It shall be ensured that the SMS-DELIVERY-REPORT reaches the same IP-SM-GW that forwarded the short message in step 1.

4) IP-SM-GW (AS) acknowledges, at the SIP level, the SMS-DELIVERY-REPORT to S-CSCF.

NOTE: This is the acknowledgement to the Forward Short Message in the SMS MT delivery procedure.

5) S-CSCF forwards the SIP acknowledgement to the SMS-DELIVERY-REPORT to the UE.

6) The IP-SM-GW (AS) sends a SMS-DELIVERY-REPORT to the SMS-GMSC.

7) The IP-SM-GW may send a Report SM Delivery Status to the HSS. This may trigger the SMS Alerting procedure or an update of the message waiting data in the HSS as described in TS 23.040 [2], if necessary.

8) The SMS-GMSC may send a SM Delivery Report Status to the HSS. The HSS shall ignore the information provided in this report.

# 6.5a      Unsuccessful SMS MT delivery procedure

When a short message fails to reach the UE via the selected domain, a failure delivery report is returned to the IP-SM-GW. The IP-SM-GW takes responsibility to re-attempt the delivery of the message in another domain which is listed in the sequence of the priority in the IP-SM-GW while the domain selection is performed during the SM MT delivery procedure. If the message successfully reaches the UE after re-delivery, the IP-SM forwards the received successful delivery report to the SMS-GMSC. Otherwise, if the message still fails after the IP-SM-GW has tried all selectable domains, the IP-SM-GW forwards the received unsuccessful delivery report to the SMS-GMSC and reports SM delivery status to the HLR/HSS. The HLR/HSS then records the corresponding Messages Waiting Data (MWD), and a short message alert procedure may be initiated as described in clause 6.5b or 6.6.

The order in which domains are selected for message delivery is subject to operator policy and/or user preferences. The following flow only shows an example order of selected domain, i.e. the IMS is the preferred domain, followed by the PS domain, and finally the CS domain.

NOTE 1: If the timer at the SMS-GMSC has been configured to a short value (near to the minimum value), the IP-SM-GW may not have sufficient time to try the message delivery in all three domains. This problem could be resolved by several implementation solutions, e.g., re-configuring the SMS-GMSC timer to be longer, or enhancing the IP-SM-GW to try the delivery only in two or one domain.
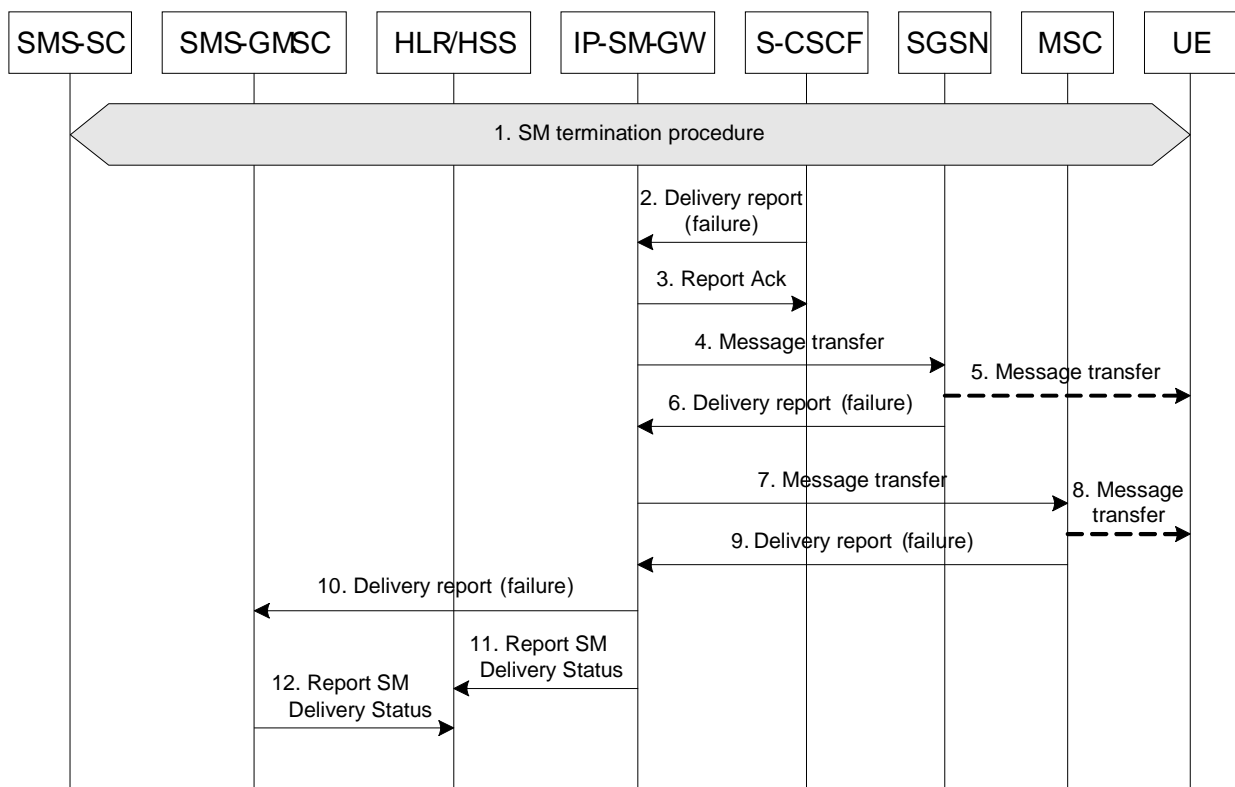


**Figure 6.5a: Unsuccessful SMS MT delivery procedure**

1) As described in clause 6.4, the short message is routed to the UE via S-CSCF after the domain selection is performed in the IP-SM-GW and all the available domains have been listed in the sequence of the priority in the IP-SM-GW. The message fails to reach the UE, e.g. due to the UE not being reachable in IMS, or exceeded memory capacity of the UE.

2) The S-CSCF sends an appropriate failure message according to normal IMS procedure as defined in TS 23.228 [9], and sends it to the IP-SM-GW (AS) including an appropriate error value. This delivery report is an acknowledgement to the short message received by the S-SCSF in step 1.

NOTE 2: When the failure message is sent from the UE, e.g. the UE notifies the network that the MS has been unable to accept a short message because its memory capacity has been exceeded, the S-CSCF forwards the failure message to the IP-SM-GW (AS).

3) IP-SM-GW (AS) acknowledges the failure message to S-CSCF.

4) The IP-SM-GW verifies the error cause of the failure delivery report. If the error is due to exceeded memory capacity of the UE, the IP-SM-GW forwards the SMS-DELIVERY-REPORT back to the SMS-GMSC and the procedure continues as described in step 10.Otherwise, the IP-SM-GW forwards the short message to the domain which is listed in the second place in its priority list. It is supposed that the SGSN is selected.

5) The SGSN delivers the message to the UE but the message fails to reach the UE, e.g. the UE is not reachable in PS domain.

NOTE 3: If the delivery succeeds in the PS domain at this point, the procedure for successful message delivery over PS domain is described in clause 6.4.

6) The SGSN generates a SMS-DELIVERY-REPORT and sends it to the IP-SM-GW, including an appropriate error value. This SMS-DELIVERY-REPORT is an acknowledgement to the short message received by the SGSN in step 5.

7) The IP-SM-GW forwards the short message to the domain which is listed in the third place in its priority list. It is supposed that the MSC is selected.

8) The MSC delivers the message to the UE but the message fails to reach the UE, e.g. the UE is not reachable in CS domain.

NOTE 4: If the delivery succeeds in the CS domain at this point, the procedure for successful message delivery over CS domain is described in clause 6.4.

9) The MSC generates a SMS-DELIVERY-REPORT and sends it to the IP-SM-GW, including an appropriate error value. This SMS-DELIVERY-REPORT is an acknowledgement to the short message received by the MSC in step 9.

10) The IP-SM-GW sends a SMS-DELIVERY-REPORT to the SMS-GMSC.

11) The IP-SM-GW sends a Report SM Delivery Status to the HSS with accurate results from different accesses (CS, PS, IMS). The HSS records the corresponding MWD, i.e. the SM-SC address which stores the un-delivered message and the failure reason which indicates that the message failed to be sent by IP-SM-GW due to the UE not being available or the memory capacity of the UE being exceeded.

12) The SMS GMSC sends a Report SM Delivery Status to the HSS. The HSS shall ignore the information provided in this report.

## 6.5b    Short Message Alert procedure when UE is available

If the HLR/HSS has recorded the MWD with a failure reason that the message failed to be sent by IP-SM-GW due to the UE not being available, once the HLR/HSS receives a message from any of the domains indicating that the UE is available again, e.g. IMSI attached, or IMS registered, the HLR/HSS initiates a short message alert procedure to request the SMSC to re-send the stored message.

The following figure only shows an example where the HLR/HSS invokes the short message alert procedure when the UE is registered in IMS.
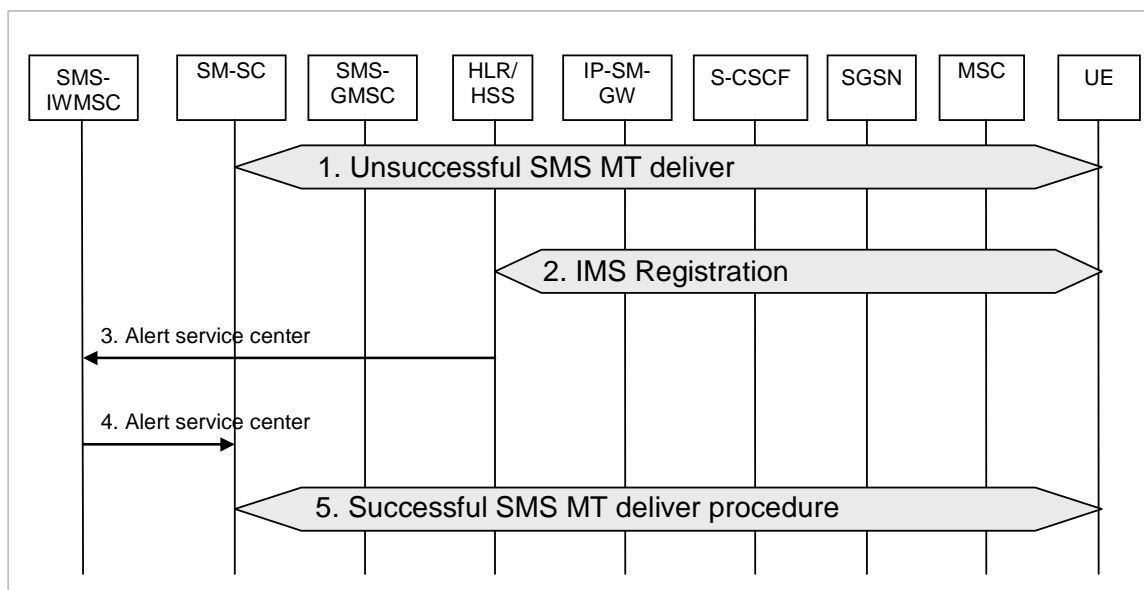
**Figure 6.5b: Short message alert procedure when UE is available**

1) After an unsuccessful SMS MT delivery procedure as described in clause 6.6, the HSS records the MWD i.e. the SM-SC address which stores the un-delivered message and the failure reason which indicates that the message failed to be sent by IP-SM-GW due to the UE not being available, for a subsequent alert SM-SC procedure.

   At any time after the unsuccessful SMS MT delivery procedure, the UE may attach in the PS and or CS domain again, in which case a Ready for SM message from the SGSN or MSC is sent to the HLR/HSS as described in TS 23.040 [2]. The HLR/HSS initiates an Alert service centre message to the SM-IWMSC when the user's MWD is not NULL, and the procedure continues as described in step 3.

2) At any time after the unsuccessful SMS MT delivery procedure, the UE may register in IMS again, the UE is registered at the S-CSCF according to the IMS registration procedures.

3) After the IMS registration is finished, the HLR/HSS checks the user's MWD, and if it is not Null, the HLR/HSS initiates an alert service centre message to the SMS-IWMSC according to the stored MWD in step 1.

4) The SMS-IWMSC forwards the alert service centre message to the responding SM-SC.

5) Upon receipt of the alert service centre message, the SM-SC re-attempts to send the stored short message as described in the clause 6.4.

# 6.6 Short Message Alert procedure when memory capacity is available

If the HLR/HSS has recorded the MWD with a failure reason that the message failed to be sent by IP-SM-GW due to the memory capacity of the UE is exceeded, once the HLR/HSS receives a message from any of the domain indicating that the memory capacity of the UE is available again, e.g. form the IMS, PS or CS domain, the HLR/HSS initiates a short message alert procedure to request the SMSC to re-send the stored message.

The following figure only shows an example where the HLR/HSS invokes the short message alert procedure when the memory capacity available message is received from IMS.
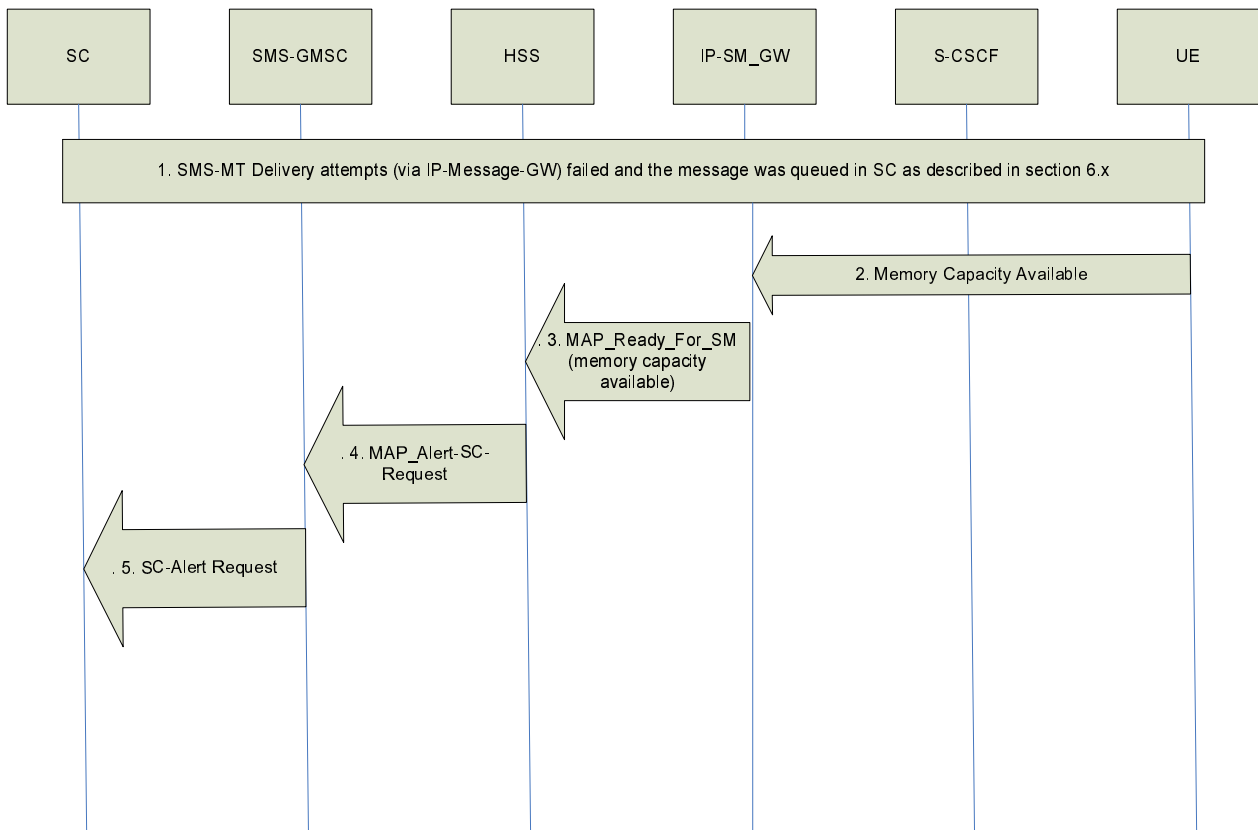
**Figure 6.6: Short message alert procedure when memory capacity is available**

1)   If SMS MT delivery attempts (via IP-SM-GW) failed because the UE"s Memory Capacity Exceeded, the message to be transferred to IP Based UE is queued in the SC.

2)   UE sends a message to IP-SM-GW indicating that the UE has memory available to receive one or more short messages.

3)   IP-SM-GW notifies the HLR/HSS of memory being available in the UE.

4)   If the HLR/HSS receives the indication that the UE has memory available to receive one or more short messages, it transfer alert information along with the SC addresses and the MSIsdn-Alert to SMS-GMSC as described in TS 23.040 [2].

5)   The SMS-GMSC sends SC Alert request messages to SM-SCs whose addresses were provided by the HLR/HSS in step 4).

# Annex A (informative):
# Change History

| Change history | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **Old** | **New** |
| 2006-09 | SP-33 | SP-060588 | - | - | - | Editorial update by MCC for presentation to TSG SA for approval | 1.3.0 | 2.0.0 |
| 2006-09 | SP-33 | SP-060631 | - | - | - | Inclusion of missed agreed update in S2-063216 before presentation to TSG SA#33 for approval | 2.0.0 | 2.1.0 |
| 2006-09 | SP-33 | SP-060657 | - | - | - | Inclusion of proposal from SP-060625 agreed at TSG SA#33. For TSG SA approval | 2.1.0 | 2.2.0 |
| 2006-09 | SP-33 | SP-060671 | - | - | - | Removal of MMS from title, keywords and Introduction | 2.2.0 | 2.3.0 |
| 2006-09 | - | - | - | - | - | Updated by MCC to version 7.0.0 after approval at TSG SA #33 | 2.3.0 | 7.0.0 |
| 2006-12 | SP-34 | SP-060826 | 0002 | 1 | F | Correction of reference and removal of redundant ones | 7.0.0 | 7.1.0 |
| 2006-12 | SP-34 | SP-060826 | 0004 | 1 | F | Alignment of terms with TS 23.040 | 7.0.0 | 7.1.0 |
| 2006-12 | SP-34 | SP-060826 | 0005 | 1 | F | Removal of MMS from Introduction | 7.0.0 | 7.1.0 |
| 2006-12 | SP-34 | SP-060826 | 0006 | 1 | F | Removal of Stage 1 requirements and insertion of architecture requirements | 7.0.0 | 7.1.0 |
| 2006-12 | SP-34 | SP-060826 | 0007 | 1 | F | Clarification of when SM-RP and SM-TL information is transferred in SIP Messages | 7.0.0 | 7.1.0 |
| 2006-12 | SP-34 | SP-060826 | 0008 | - | F | Implementation of IP-SM-GW functional description | 7.0.0 | 7.1.0 |
| 2006-12 | SP-34 | SP-060826 | 0009 | 1 | F | SMSIP architecture corrections | 7.0.0 | 7.1.0 |
| 2007-03 | SP-35 | SP-070096 | 0013 | 5 | C | Delivery report handling | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0014 | - | F | General amendment on TS 23.204 | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0016 | 1 | F | Correlation identifier in the MT procedure | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0019 | 3 | C | Implementation of the interfaces between IP-SM-GW and HSS | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0022 | 1 | F | Network initiated de-registration | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0023 | 2 | B | SMS Alerting after Registration | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0024 | 3 | B | SMS Alerting for Retry | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0026 | 2 | F | SMS Subscriber data based on iFC | 7.1.0 | 7.2.0 |
| 2007-03 | SP-35 | SP-070096 | 0028 | - | C | Configuration of the IP-SM-GW in the HSS, Clarification for subscriber data in TS 23.204, Correction on SMS MT delivery procedure, Successful MT Delivery Procedure in SMS-IP Architecture | 7.1.0 | 7.2.0 |
| 2007-06 | SP-36 | SP-070395 | 0030 | 1 | F | Rearrangement for the SMS MT delivery procedure | 7.2.0 | 7.3.0 |
| 2007-06 | SP-36 | SP-070395 | 0031 | - | F | Removal of the editor's note on IP-SM-GW timer | 7.2.0 | 7.3.0 |
| 2007-06 | SP-36 | SP-070395 | 0034 | 3 | F | Corrections on interfaces between the IP-SM-GW and the HSS | 7.2.0 | 7.3.0 |
| 2007-09 | SP-37 | SP-070579 | 0035 | 1 | F | Update 23.204 to reflect CT4 changes on SM Delivery Report Status handling | 7.3.0 | 7.4.0 |
| 2008-03 | SP-39 | SP-080108 | 0049 | 2 | F | Correction to Reference | 7.4.0 | 7.5.0 |
| 2009-03 | SP-43 | SP-090111 | 0076 | 2 | F | Correction of procedure for SM termination through the home network | 7.5.0 | 7.6.0 |

# History

| Document history | | |
|---|---|---|
| V7.3.0 | June 2007 | Publication |
| V7.4.0 | October 2007 | Publication |
| V7.5.0 | April 2008 | Publication |
| V7.6.0 | March 2009 | Publication |
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