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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - 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

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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:

Version x.y.z

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- x the first digit:
  - 1 presented to TSG for information;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
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1 Scope

The present document provides the protocol details for SMS over IP within the IP Multimedia (IM) Core Network (CN) subsystem based on the Session Initiation Protocol (SIP) and SIP Events as defined in 3GPP TS 24.229 [10].

Where possible the present document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of SIP and SIP Events, either directly, or as modified by 3GPP TS 24.229 [10].

The present document is applicable to Application Servers (ASs) and User Equipment (UE) providing SMS over IP functionality.

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 23.002: "Network Architecture".

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

[4] 3GPP TS 23.140: "Multimedia Messaging Service (MMS); Functional description; Stage 2".

[5] 3GPP TS 23.204: "Support of SMS over generic 3GPP IP access; Stage 2".

[6] 3GPP TS 23.218: "IP Multimedia (IM) session handling; IM call model; Stage 2".

[7] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[8] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[8A] 3GPP TS 24.167: "3GPP IMS Management Object (MO)".

[9] 3GPP TS 24.228 Release 5: "Signalling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[10] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[11] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[12] RFC 3261 (June 2002): "SIP: Session Initiation Protocol".

[13] RFC 3325 (November 2002): "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks".

[14] RFC 3428 (December 2002): "Session Initiation Protocol (SIP) Extension for Instant Messaging".

[15] RFC 3680 (March 2004): "A Session Initiation Protocol (SIP) Event Package for Registrations".

[16] RFC 3840 (August 2004): "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)".

[17] RFC 3841 (August 2004): "Caller Preferences for the Session Initiation Protocol (SIP)".

[18] 3GPP TS 31.103: "Characteristics of the IP Multimedia Services Identity Module (ISIM) Application".

[19] 3GPP TS 31.102: "Characteristics of the Universal Subscriber Identity Module (USIM) Application".

[20] 3GPP TS 51.011 Release 4: "Specification of the Subscriber Identity Module, Mobile Equipment (SIM - ME) interface".

[21] 3GPP TS 31.111: "Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)".

[22] 3GPP TS 23.003: "Numbering, addressing and identification".

[23] 3GPP TS 29.311: "Service Level Interworking (SLI) for messaging services".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

SM-over-IP sender: the A party that sends an SM using a SIP MESSAGE request including a vnd.3gpp.sms payload (introduced in 3GPP TS 23.140 [4]).

SM-over-IP receiver: the B party that receives an SM encapsulated in the vnd.3gpp.sms payload of a SIP MESSAGE request.

For the purposes of the present document, the following terms and definitions given in RFC 3261 [12] apply.

Header
Header field
Method
Request
Response
(SIP) transaction
Status-code (see RFC 3261 [12], subclause 7.2)
Tag (see RFC 3261 [12], subclause 19.3)

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.002 [2], subclauses 4.1.1.1 and 4a.7 apply:

Call Session Control Function (CSCF)
Home Subscriber Server (HSS)

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.218 [6], subclause 3.1 apply:

Filter criteria
Initial filter criteria

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.228 [7], subclauses 4.3.3.1, 4.3.6 and 4.6 apply:

Interrogating-CSCF (I-CSCF)
Public Service Identity (PSI)
Proxy-CSCF (P-CSCF)

Serving-CSCF (S-CSCF)

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 23.040 [3] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AS Application Server
IP-SM-GW IP-Short-Message-Gateway

4 Overview of SMS over IP functionality

4.1 Introduction

SMS over IP functionality provides the UE with the capability of sending traditional short messages over IMS network. The architecture for SMS is specified in 3GPP TS 23.040 [3] and for SMS over IP functionality in 3GPP TS 23.204 [5].

4.2 SMS over IP

In order to guarantee SMS interoperability the SM-over-IP sender, the SM-over-IP receiver and the IP-SM-GW shall support encapsulation of RPDUs defined in 3GPP TS 24.011 [8], subclause 7.3. The SM-over-IP sender, the SM-over-IP receiver and the IP-SM-GW shall use the MIME type "application/vnd.3gpp.sms" for this purpose.

4.3 Application utilisation of SMS over IP

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

4.4 SMS over IP and subscription without MSISDN

When SMS over IP is to be delivered to a subscriber where the subscription profile does not contain an MSISDN, then there is a need for the IP-SM-GW to become aware of the IMSI during IMS registration for later correlation of short messages. In order to do so the IP-SM-GW derives the IMSI from the private user identity of the user that the UE includes in the REGISTER request at registration or if the private user identity is not available, derives the IMSI from the public user identity.

3GPP TS 23.003 [22] defines the relationship between the private user identity and the IMSI and the relationship between the public user identity and the IMSI.

5 SIP related procedures

5.1 Introduction

5.2 Functional entities

5.2.1 User Equipment (UE)

A UE may implement the role of an SM-over-IP sender (see subclause 5.3.1) or an SM-over-IP receiver (see subclause 5.3.2). A mechanism for the home operator to configure the UE to use SMS over IP is given in 3GPP TS 24.167 [8A]. Additional parameters such as the PSI of the SC of the SM-over-IP sender can be obtained from

the UICC as per 3GPP TS 31.103 [18] and 3GPP TS 31.102 [19] if used or from the SIM as per 3GPP TS 51.011 [20] if used.

NOTE: The capability of sending short messages over IP does not affect current limitations, thus the UE is limited to send at most one UE originated SM and to receive at most one UE terminated SM at a time.

5.2.2 Application Server (AS)

An AS may implement the role of an IP-SM-GW (see subclause 5.3.3).

5.3 Roles

5.3.1 SM-over-IP sender

5.3.1.1 General

In addition to the procedures specified in subclause 5.3.1, the SM-over-IP sender shall support the procedures specified in 3GPP TS 24.229 [10] appropriate to the functional entity in which the SM-over-IP sender is implemented. The SM-over-IP sender shall build and populate RP-DATA message, containing all the information that a mobile station submitting an SM according to 3GPP TS 24.011 [8] would place, for successful delivery. The SM-over-IP sender shall parse and interpret RP- DATA, RP-ACK and RP-ERROR messages, containing all the information that a mobile station receiving an SM according to 3GPP TS 24.011 [8] would see, in a SM submission or status report.

5.3.1.2 Submitting a short message

When an SM-over-IP sender wants to submit an SM over IP, the SM-over-IP sender shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain the PSI of the SC of the SM-over-IP sender;

NOTE 1: The PSI of the SC can be SIP URI or tel URI based on operator policy. The PSI of the SC can be obtained using one of the following methods in the priority order listed below:

1) provided by the user;

2) if UICC is used, then:

- if present in the ISIM, then the PSI of the SC is obtained from the $EF_{PSISMSC}$ in DF_TELECOM of the ISIM as per 3GPP TS 31.103 [18];

- if not present on the ISIM, then the PSI of the SC is obtained from the $EF_{PSISMSC}$ in DF_TELECOM of the USIM as per 3GPP TS 31.102 [19]; or

- if neither present on the ISIM nor on the USIM, then the PSI of the SC contains the TS-Service-Centre-Address stored in the EF_{SMSP} in DF_TELECOM as per 3GPP TS 31.102 [19]. If the PSI of the SC is based on the E.164 number from the TS-Service-Centre-Address stored in the EF_{SMSP} in DF_TELECOM then the URI constructed can be either a tel URI or a SIP URI (using the "user=phone" SIP URI parameter format).

3) if SIM is used instead of UICC, then the PSI of the SC contains the TS-Service Centre Address stored in the EF_{SMSP} in DF_TELECOM as per 3GPP TS 51.011 [20]. If the PSI of the SC is based on the E.164 number from the TS-Service-Centre-Address stored in the EF_{SMSP} in DF_TELECOM then the URI constructed can be either a tel URI or a SIP URI (using the "user=phone" SIP URI parameter format); or

4) if neither the UICC nor SIM is used, then how the PSI of the SC is configured and obtained is through means outside the scope of this specification.

b) the From header, which shall contain a public user identity of the SM-over-IP sender;

NOTE 2: The IP-SM-GW will have to use an address of the SM-over-IP sender that the SC can process (i.e. an E.164 number). This address will come from a tel URI in a P-Asserted-Identity header (as defined in RFC 3325 [13]) placed in the SIP MESSAGE request by the P-CSCF or S-CSCF.

NOTE 3: The SM-over-IP sender has to store the Call-ID of the SIP MESSAGE request, so it can associate the appropriate SIP MESSAGE request including a submit report with it.

c) the To header, which shall contain the PSI of the SC of the SM-over-IP sender;

d) the Content-Type header, which shall contain "application/vnd.3gpp.sms"; and

e) the body of the request shall contain an RP-DATA message as defined in 3GPP TS 24.011 [8], including the SMS headers and the SMS user information encoded as specified in 3GPP TS 23.040 [3].

NOTE 4: The address of the SC is included in the RP-DATA message content. The address of the SC included in the RP-DATA message content is stored in the EF_{SMSP} in DF_TELECOM of the (U)SIM of the SM-over-IP sender.

NOTE 5: The SM-over-IP sender will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

NOTE 6: Both the address of the SC and the PSI of the SC can be configured in the $EF_{PSISMSC}$ in DF_TELECOM of the USIM and ISIM respectively using the USAT as per 3GPP TS 31.111 [21].

The SM-over-IP sender may request the SC to return the status of the submitted message. The support of status report capabilities is optional for the SC.

When a SIP MESSAGE request including a submit report in the "vnd.3gpp.sms" payload is received, the SM-over-IP sender shall:

- if SM-over-IP sender supports In-Reply-To header usage and the In-Reply-To header indicates that the request corresponds to a short message submitted by the SM-over-IP sender, generate a 200 (OK) SIP response according to RFC 3428 [14].

  if SM-over-IP sender supports In-Reply-To header usage and the In-Reply-To header indicates that the request does not correspond to a short message submitted by the SM-over-IP sender, a 488 (Not Acceptable here) SIP response according to RFC 3428 [14].

- if SM-over-IP sender does not support In-Reply-To header usage, generate a 200 (OK) SIP response according to RFC 3428 [14]; and extract the payload encoded according to 3GPP TS 24.011 [8] for RP-ACK or RP-ERROR.

5.3.1.3 Receiving a status report

When a SIP MESSAGE request including a status report in the "vnd.3gpp.sms" payload is delivered, the SM-over-IP sender shall:

- generate a SIP response according to RFC 3428 [14];

- extract the payload encoded according to 3GPP TS 24.011 [8] for RP-DATA; and

- create a delivery report for the status report as described in subclause 5.3.2.4. The content of the delivery report is defined in 3GPP TS 24.011 [8].

5.3.2 SM-over-IP receiver

5.3.2.1 General

In addition to the procedures specified in subclause 5.3.2, the SM-over-IP receiver shall support the procedures specified in 3GPP TS 24.229 [10] appropriate to the functional entity in which the SM-over-IP receiver is implemented. The SM-over-IP receiver shall build and populate RP-SMMA, RP-ACK, and RP-ERROR messages, containing all the information that a mobile station according to 3GPP TS 24.011 [8] would place, for a notification for availability of memory and a delivery report. The SM-over-IP receiver shall parse and interpret RP- DATA message, containing all the information that a mobile station receiving an SM according to 3GPP TS 24.011 [8] would see, in a SM delivery.

5.3.2.2 Registration

On sending a REGISTER request, the SM-over-IP receiver shall indicate its capability to receive traditional short messages over IMS network by including a "+g.3gpp.smsip" parameter into the Contact header according to RFC 3840 [16].

5.3.2.3 Delivery of a short message

When a SIP MESSAGE request including a short message in the "vnd.3gpp.sms" payload is delivered, the SM-over-IP receiver shall:

- generate a SIP response according to RFC 3428 [14];
- extract the payload encoded according to 3GPP TS 24.011 [8] for RP-DATA; and
- create a delivery report as described in subclause 5.3.2.4. The content of the report is defined in 3GPP TS 24.011 [8].

5.3.2.4 Sending a delivery report

When an SM-over-IP receiver wants to send an SM delivery report over IP, the SM-over-IP receiver shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain the IP-SM-GW;

NOTE 1: The address of the IP-SM-GW is received in the P-Asserted-Identity header in the SIP MESSAGE request including the delivered short message.

b) the From header, which shall contain a public user identity of the SM-over-IP receiver.

c) the To header, which shall contain the IP-SM-GW;

d) the In-Reply-To header which shall contain the Call-Id of the SIP MESSAGE request that was received in the received short message;

e) the Content-Type header shall contain "application/vnd.3gpp.sms"; and

f) the body of the request shall contain the RP-ACK or RP-ERROR message for the SM delivery report, as defined in 3GPP TS 24.011 [8].

NOTE 2: The SM-over-IP sender will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

5.3.2.5 Sending a notification about SM-over-IP receiver having memory available

When an SM-over-IP receiver wants to send a notification about UE having memory available, the SM-over-IP receiver shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain the IP-SM-GW;

NOTE 1: The address of the IP-SM-GW is received in the P-Asserted-Identity in the SIP MESSAGE request that included the short message the UE could not store.

b) the From header, which shall contain a public user identity of the SM-over-IP receiver;

c) the To header, which shall contain the IP-SM-GW;

d) the Content-Type header shall contain "application/vnd.3gpp.sms"; and

e) the body of the request shall contain an RP-SMMA message, see 3GPP TS 24.011 [8], including the SMS headers and the SMS user information encoded as specified in 3GPP TS 23.040 [3].

NOTE 2: The SM-over-IP receiver will use content transfer encoding of type "binary" for the encoding of the SMS in the body of the SIP MESSAGE request.

5.3.3 IP-Short-Message-Gateway (IP-SM-GW)

5.3.3.1 General

An IP-SM-GW is an entity that provides the protocol interworking for the submission of short messages from the SM-over-IP sender to the SC, for the delivery of short messages from the SC to the SM-over-IP receiver, and for the SMS-Status Reports from the SC to the SM-over-IP sender.

In addition to the procedures specified in subclause 5.3.3, the IP-SM-GW shall support the procedures specified in subclause 5.7 in 3GPP TS 24.229 [10].

5.3.3.2 Indication of SM-over-IP receiver availability status for delivery of short messages

NOTE 1: If operator policy does not require the indication the availability status of public user identity for receiving SMS over IP messages, then IP-SM-GW will not receive third-party REGISTER request.

Upon receipt of a third-party REGISTER request, the IP-SM-GW shall:

- send a 200 (OK) response for the REGISTER request;
- if an MSISDN is received in the message body of the third party REGISTER request within the <service-info> XML element, store the MSISDN sent in the message body of the REGISTER request within the <service-info> XML element.
- if no MSISDN is received,

  a) if an Authorization header field was contained in the REGISTER request received from the UE that is contained in a "message/sip" MIME body of the third party REGISTER request, derive the IMSI from the private user identity obtained from the "username" header field parameter of the Authorization header field in the REGISTER request received from the UE that is contained in a "message/sip" MIME body of the third party REGISTER request; or

  b) if no Authorization header field was contained in the REGISTER request received from the UE that is contained in a "message/sip" MIME body of the third party REGISTER request derive the IMSI from the public user identity obtained from the "To" header field in the REGISTER request received from the UE that is contained in a "message/sip" MIME body of the third party REGISTER request; and

NOTE 2: The actual format of the <service-info> element is transparent to the S-CSCF.

NOTE 3: The relation between private user identity and the IMSI is defined in 3GPP TS 23.003 [22].

NOTE 4: 3GPP TS 24.229 [10] specifies how the REGISTER request from the UE can be included in the third party REGISTER request.

- subscribe to the reg event package for the public user identity registered at the user's registrar (S-CSCF) as described in RFC 3680 [15].

Upon receipt of a NOTIFY request the IP-SM-GW shall check the availability status for receiving SMS over IP messages, i.e. if the public user identity has a contact registered with the ability to receive SMS over IP messages. If the availability status of the public user identity for receiving SMS over IP messages has changed, the IP-SM-GW shall start a data update procedure to the HSS as specified in 3GPP TS 29.002 [11] to indicate that either the MSISDN or IMSI registered with it is available/unavailable for delivery of SMS.

5.3.3.3 Answering routing information query

If a routing information query is received from the HSS/HLR, the IP-SM-GW shall extract the MSISDN of the SM-over-IP receiver (destination UE) from the received message. If the IP-SM-GW has information about a public user identity associated with the MSISDN, the IP-SM-GW shall return its own address to the SMS-GMSC that originated the routing information query.

If the IP-SM-GW has no information related to the MSISDN of the SM-over-IP receiver (destination UE), the IP-SM-GW shall query the HSS/HLR for routing information. If the query results in an error response, the IP-SM-GW shall

return the error response to the SMS-GMSC; otherwise the IP-SM-GW shall return its own address to the SMS-GMSC that originated the routing information query.

NOTE: The address of the SMS-GMSC is available in the received routing information query.

5.3.3.4 Transport layer interworking

5.3.3.4.1 Receiving a short message in a SIP MESSAGE request

NOTE 1: The SIP MESSAGE received from the SM-over-IP sender/receiver will include a P-Asserted-Identity header (as defined in RFC 3325 [13]) containing a tel URI of the SM-over-IP sender/receiver and will contain either a short message (RP-DATA), or a notification for availability of memory (RP-SMMA), or a delivery report (RP-ACK or RP-ERROR).

If a SIP MESSAGE request including "vnd.3gpp.sms" payload is received from the SM-over-IP sender/receiver and the IP-SM-GW does not support the In-Reply-To header usage, the IP-SM-GW shall:

1) respond with a 202 (Accepted) response;

2) extract and validate the format of the SC address from the received payload as defined in 3GPP TS 24.011 [8] and 3GPP TS 23.040 [3];

3) extract the RPDU type (see 3GPP TS 24.011 [8]) from the received payload;

4) add the MSISDN of the SM-over-IP receiver to the RP International Mobile Subscriber Identity field if the received payload is a notification for availability of memory. If the MSISDN of the SM-over-IP receiver is not available then insert the tel URI received in a P-Asserted-Identity header (as defined in RFC 3325 [13]) placed in the SIP MESSAGE request by the P-CSCF or S-CSCF; and

NOTE 2: The MSISDN is not available if the registration is not required according to the operator policy.

5) include the RPDU type in the appropriate message to

- the SC via SMS-IWMSC in case of a short message;
- the SC via SMS-GMSC in case of a delivery report; or
- the HSS in case of a notification for availability of memory.

If step 2) or 3) above fails for message that contains RPDU with RP-DATA or RP-SMMA content, the IP-SM-GW shall send a SIP MESSAGE request with the following information:

a) the Request-URI, containing the sending user"s URI;

b) the Content-Type header, set to "application/vnd.3gpp.sms"; and

c) the body of the request containing an RP-ERROR message including an appropriate error code as defined in 3GPP TS 24.011 [8].

NOTE 3: The IP-SM-GW will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

If a SIP MESSAGE request including "vnd.3gpp.sms" payload is received from the sender/receiver, and the IP-SM-GW supports the In-Reply-To header, the IP-SM-GW shall:

1) if the SIP MESSAGE does not include the In-Reply-To header:

   a) respond with a 202 (Accepted) response;

   b) extract and validate the format of the SC address from the received payload as defined in 3GPP TS 24.011 [8] and 3GPP TS 23.040 [3];

   c) extract the RPDU type (see 3GPP TS 24.011 [8]) from the received payload;

   d) the MSISDN of the SM-over-IP receiver to the RP International Mobile Subscriber Identity field if the received payload is a notification for availability of memory. If the MSISDN of the SM-over-IP receiver is

not available then insert the tel URI received in a P-Asserted-Identity header (as defined in RFC 3325 [13]) placed in the SIP MESSAGE request by the P-CSCF or S-CSCF; and

NOTE 4: The MSISDN is not available if the registration is not required according to the operator policy.

e) include the RPDU type in the appropriate message to

- the SC via SMS-IWMSC in case of a short message;
- the SC via SMS-GMSC in case of a delivery report; or
- the HSS in case of a notification for availability of memory.

If step b) or c) above fails for message that contains RPDU with RP-DATA or RP-SMMA content, the IP-SM-GW shall send a SIP MESSAGE request with the following information:

- the Request-URI, containing the sending user"s URI;
- the Content-Type header, set to "application/vnd.3gpp.sms"; and
- the body of the request containing an RP-ERROR message including an appropriate error code as defined in 3GPP TS 24.011 [8].

NOTE 5: The IP-SM-GW will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

2) if the SIP MESSAGE includes the In-Reply-To header:

a) if the In-Reply-To header indicates that the request does not correspond to a short message submitted by the IP-SM-GW, send a 488 (Not Acceptable here) SIP response according to RFC 3428 [14];

b) if the In-Reply-To header indicates that the request corresponds to a short message submitted by the IP-SM-GW:

- generate a 202 (Accepted) SIP response according to RFC 3428 [14];
- extract and validate the format of the SC address from the received payload as defined in 3GPP TS 24.011 [8] and 3GPP TS 23.040 [3];
- extract the RPDU type (see 3GPP TS 24.011 [8]) from the received payload;
- add the MSISDN of the SM-over-IP receiver to the RP International Mobile Subscriber Identity field if the received payload is a notification for availability of memory. If the MSISDN of the SM-over-IP receiver is not available then insert the tel URI received in a P-Asserted-Identity header (as defined in RFC 3325 [13]) placed in the SIP MESSAGE request by the P-CSCF or S-CSCF; and

NOTE 6: The MSISDN is not available if the registration is not required according to the operator policy.

- include the RPDU type in the appropriate message within the same MAP dialog delivering the short message to
  - the SC via SMS-GMSC in case of a delivery report; or
  - the HSS in case of a notification for availability of memory.

NOTE 7: The IP-SM-GW finding the MAP dialog using the SIP session identified by the Call-ID contained in the In-Reply-To header.

if step 2) or 3) above fails for message that contains RPDU with RP-SMMA content, the IP-SM-GW shall send a SIP MESSAGE request with the following information:

- the Request-URI, containing the sending user"s URI;
- the Content-Type header, set to "application/vnd.3gpp.sms"; and
- the body of the request containing an RP-ERROR message including an appropriate error code as defined in 3GPP TS 24.011 [8].

NOTE 8: The IP-SM-GW will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

5.3.3.4.2 Delivering a short message in a SIP MESSAGE request

If a short message is received from the SMS-GMSC, the IP-SM-GW shall extract the IMSI of the SM-over-IP receiver from the received message. Then the IP-SM-GW shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain a public user identity of the SM-over-IP receiver associated with the received IMSI;

b) the Accept-Contact header, which shall contain a "+g.3gpp.smsip" parameter and the "explicit" and "require" tags according to RFC 3841 [17];

c) the Request-Disposition header which shall contain the "no-fork" directive;

d) the P-Asserted-Identity header which shall contain the SIP URI of the IP-SM-GW;

e) the Content-Type header which shall contain "application/vnd.3gpp.sms"; and

f) the body of the request which shall contain an RP-DATA message as defined in 3GPP TS 24.011 [8], including the SMS headers and the SMS user information encoded as specified in 3GPP TS 23.040 [3].

NOTE 1: The IP-SM-GW will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

If the IP-SM-GW cannot deliver the short message successfully in a SIP MESSAGE request and cannot deliver the short message via SGSN or MSC, then the IP-SM-GW will apply the procedures defined in 3GPP TS 29.311 [23] subclause 6.1.4.4.1 to send a delivery report to SC via SMS-GMSC.

NOTE 2: If routing information is available (SGSN or MSC address or both), the IP-SM-GW can also attempt the delivery of a short message via SGSN or MSC or both before sending a delivery report to SC via SMS-GMSC. The priority order of these attempts (i.e., SMS over IP, SMS over CS, SMS over PS) is subject to operator policy. However, if no MSISDN is present in the short message then no routing information is obtainable by the IP-SM-GW, and attempting delivery of the short message via other domains (e.g. MSC, SGSN) by the IP-SM-GW is not possible.

5.3.3.4.3 Forwarding a submit report in a SIP MESSAGE request

If an SM submit report is received from the SMS-IWMSC, the IP-SM-GW shall retrieve the IMSI of the SM-over-IP sender from the existing MAP context. Then the IP-SM-GW shall obtain a corresponding public user identity and send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain a public user identity of the SM-over-IP sender;

b) the Request-Disposition header which shall contain the "fork" and optionally the "parallel" directives;

c) the In-Reply-To header which shall contain the Call-Id of the SIP MESSAGE request that included the submitted short message;

d) the P-Asserted-Identity header which shall contain the SIP URI of the IP-SM-GW;

e) the Content-Type header which shall contain "application/vnd.3gpp.sms"; and

f) the body of the request which shall contain an RP-ACK or RP-ERROR message as defined in 3GPP TS 24.011 [8].

NOTE: The IP-SM-GW will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

5.3.3.4.4 Delivering a status report in a SIP MESSAGE request

If a status report is received from the SMS-GMSC, the IP-SM-GW shall extract the IMSI of the SM-over-IP sender from the received message. Then the IP-SM-GW shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain a public user identity of the SM-over-IP sender associated with the received IMSI;

b) the Accept-Contact header, which shall contain a "+g.3gpp.smsip" parameter and the "explicit" and "require" tags according to RFC 3841 [17];

c) the Request-Disposition header which shall contain the "no-fork" directive;

NOTE 1: The status report is always sent to the SMS capable UE that registered with the highest q value.

d) the Content-Type header which shall contain "application/vnd.3gpp.sms"; and

e) the body of the request which shall contain an RP-DATA message as defined in 3GPP TS 24.011 [8], including the SMS headers and the SMS user information encoded as specified in 3GPP TS 23.040 [3].

NOTE 2: The IP-SM-GW will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

If the IP-SM-GW cannot deliver the status report successfully in a SIP MESSAGE request and cannot deliver the short message via SGSN or MSC, then the IP-SM-GW will apply the procedures defined in 3GPP TS 29.311 [23] subclause 6.1.4.4.1 to send a delivery report to SC via SMS-GMSC.

NOTE 3: If routing information is available (SGSN or MSC address or both), the IP-SM-GW can also attempt the delivery of a short message via SGSN or MSC or both before sending a delivery report to SC via SMS-GMSC. The priority order of these attempts (i.e., SMS over IP, SMS over CS, SMS over PS) is subject to operator policy.

NOTE 4: The SM-over-IP sender will acknowledge the status report with a delivery report.

Annex A (normative): Media feature tags defined within the current document

A.1 General

This subclause describes the media feature tag definitions that are applicable for the 3GPP IM CN Subsystem for the realisation of SMS over IP.

A.2 Definition of media feature tag g.3gpp.smsip

Media feature tag name: g.3gpp.smsip

ASN.1 Identifier: 1.3.6.1.8.2.3

Summary of the media feature indicated by this tag: This feature-tag indicates that the device is capable of accepting SMS messages via SIP.

Values appropriate for use with this media feature tag: Boolean.

The media feature tag is intended primarily for use in the following applications, protocols, services, or negotiation mechanisms: This media feature tag is most useful within SIP for noting the SMS capabilities of a device, such as a phone or PDA.

Examples of typical use: Indicating that a mobile phone can receive short message encapsulated in a SIP MESSAGE request.

Related standards or documents: 3GPP TS 24.341: "Support of SMS over IP networks, stage 3"

Security Considerations: Security considerations for this media feature tag are discussed in subclause 11.1 of RFC 3840 [16].

Annex B (informative): Example signalling flows of SMS over IP functionality

B.1 Scope of signalling flows

This annex gives examples of signalling flows for the SMS over IP within the IP Multimedia (IM) Core Network (CN) subsystem based on the Session Initiation Protocol (SIP) and SIP Events.

These signalling flows provide detailed signalling flows, which expand on the overview information flows provided in 3GPP TS 23.204 [5].

B.2 Introduction

B.2.1 General

The signalling flows provided in this annex follow the methodology developed in 3GPP TS 24.228 [9]. The following additional considerations apply:

a) 3GPP TS 24.228 [9] shows separate signalling flows with no configuration hiding between networks, and with configuration hiding between networks. There is no SMS over IP specific functionality associated with this hiding, and therefore such separate signalling flows are not show in the present document; and

b) 3GPP TS 24.228 [9] does not show the functionality between the S-CSCF and the AS. As the SMS over IP functionality depends on the functionality provided by an AS, the signalling flows between S-CSCF and AS are shown in the present document.

B.2.2 Key required to interpret signalling flows

The key to interpret signalling flows specified in 3GPP TS 24.228 [9] subclauses 4.1 and 4.2 applies with the additions specified below.

- ipsmgw.home1.net, ipsmgw.home2.net: IP-SM-GW in the home network of the SM-over-IP sender/receiver;
- sc.home1.net: PSI of the SC of the SM-over-IP sender
- user1_public1@home1.net: SM-over-IP sender; and
- user2_public2@home2.net: SM-over-IP receiver.

As in 3GPP TS 24.228 [9], in order to differentiate between SIP methods and other protocol messages, the message name is preceded with the associated protocol for all non-SIP messages.

Each signalling flow table contains descriptions for headers where the content of the header is new to that signalling flow, as is already performed in 3GPP TS 24.228 [9].

However, 3GPP TS 24.228 [9] includes extensive descriptions for the contents of various headers following each of the tables representing the contents of the signalling flows. Where the operation of the header is identical to that shown in 3GPP TS 24.228 [9], then such text is not reproduced in the present document.

Additional text may also be found on the contents of headers within 3GPP TS 24.228 [9] in addition to the material shown in the present document.

B.3 Signalling flows demonstrating how IP-SM-GW indicates to HSS the availability of public user identity for delivery of short messages

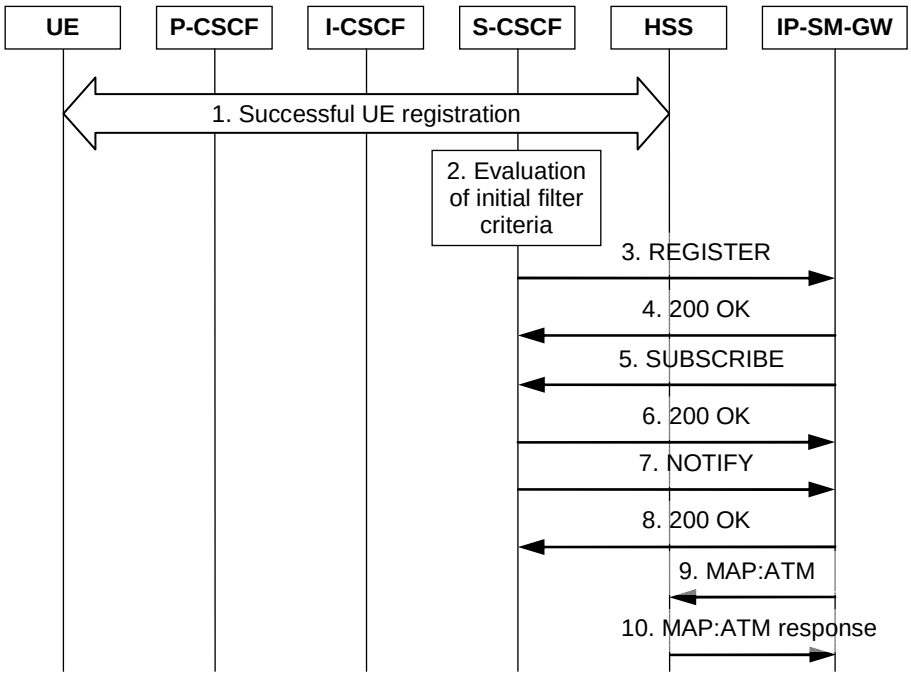

Figure B.3-1: IP-SM-GW registration signalling

Figure B.3-1 shows the registration signalling flow for the scenario when IP-SM-GW registers to HSS. The details of the signalling flows are as follows:

1. **See 3GPP TS 24.228 [9], subclause 6.2 steps 1 through 22**

NOTE 1: 3GPP TS 24.228 [9] contains Rel-5 registration; additional parameters might appear in Rel-7 registration.

2. **Initial filter criteria**

   The S-CSCF analyses the incoming request against the initial filter criteria and decides to send a third-party REGISTER request to the IP-SM-GW. Initial Filter Criteria for IP-SM-GW includes a Service Information that contains the MSISDN belonging to "sip:user1_public1@home1.net".

3. **REGISTER request (S-CSCF to IP-SM-GW) - see example in table B.3-1**

   This signalling flow forwards the REGISTER request from the S-CSCF to the IP-SM-GW.

Table B.3-1: REGISTER request (S-CSCF to IP-SM-GW)

```
REGISTER sip:ipsmgw.home1.net SIP/2.0
Via: SIP/2.0/UDP sip:scscf1.home1.net
Max-Forwards: 70
P-Access-Network-Info:
P-Visited-Network-ID:
P-Charging-Vector:
P-Charging-Function-Addresses:
From: <sip:scscf1.home1.net>;tag=14142
To: <sip:user1_public1@home1.net>
Contact: <sip:scscf1.home1.net>
Expires: 600000
Call-ID: apb03a0s09dkjdfglkj49112
```

```
CSeq: 43 REGISTER
Content-Type: application/3gpp-ims+xml
Content-Length: (...)

<?xml version="1.0" encoding="UTF-8"?>
<ims-3gpp version="1">
  <service-info>11111111</service-info>
</ims-3gpp>
```

4. **200 OK response (IP-SM-GW to S-CSCF) - see example in table B.3-2**

The IP-SM-GW sends a 200 (OK) response to the S-CSCF indicating that registration was successful.

Table B.3-2: 200 OK response (IP-SM-GW to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP sip:scscf1.home1.net
From:
To:
Call-ID:
Contact: <sip:scscf1.home1.net>;expires=600000
CSeq:
Date: Wed, 11 July 2001 08:49:37 GMT
Content-Length:
```

5. **SUBSCRIBE request (IP-SM-GW to S-CSCF) – see example in table B.3-3**

The IP-SM-GW subscribes to the S-CSCF for the registration status of the registered subscriber.

Table B.3-3 SUBSCRIBE request (IP-SM-GW to S-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
P-Asserted-Identity: <sip:ipsmgw.home1.net>
P-Charging-Vector: icid-value="gwrg65hy35gw5hfrD46=583735358"; orig-ioi="type-3home1.net"
P-Charging-Function-Addresses: ccf=[5555:c88:d77::c66]; ecf=[5555:c88:d77::e67]
From: <sip:ipsmgw.home1.net>;tag=31415286
To: <sip:scscf1.home1.net>
Call-ID: 56uher6y5hrwy5wseg5y4w
CSeq: 111 SUBSCRIBE
Event: reg
Expires: 600000
Accept: application/reginfo+xml
Contact: <sip:ipsmgw.home1.net>
Content-Length: 0
```

Request-URI: Public user identity whose registration status event the IP-SM-GW subscribes to.

6. **200 (OK) response (S-CSCF to IP-SM-GW) - see example in table B.3-4**

The S-CSCF sends a 200 (OK) response to the IP-SM-GW.

Table B.3-4: 200 (OK) response (S-CSCF to IP-SM-GW)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK240tfe2
P-Asserted-Identity:
From: <sip:ipsmgw.home1.net>;tag=31415286
To: <sip:scscf1.home1.net>;tag=14142
Call-ID:
CSeq:
Contact:
Expires:
Content-Length:
```

7. **NOTIFY request (S-CSCF to IP-SM-GW) - see example in table B.3-5**

The S-CSCF sends a first NOTIFY request to the IP-SM-GW. The notification indicates that the monitored public user identity registered using an SMS capable UE.

Table B.3-5: NOTIFY request (S-CSCF to IP-SM-GW)

```
NOTIFY sip:ipsmgw.home1.net SIP/2.0
Max-Forwards: 70
From: <sip:scscf1.home1.net>;tag=14142
To: <sip:ipsmgw.home1.net>;tag=31415286
Call-ID: 56uher6y5hrwy5wseg5y4w
CSeq: 222 NOTIFY
Subscription-State: active;expires=600000
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:scscf1.home1.net>
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo" version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="a7" state="active">
         <contact id="76" state="active" event="registered">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
             <unknown-param name="+g.3gpp.smsip"/>
         </contact>
     </registration>
</reginfo>
```

8. 200 (OK) response (IP-SM-GW to S-CSCF) - see example in table B.3-6

IP-SM-GW sends a 200 (OK) response to the S-CSCF.

Table B.3-6: 200 (OK) response (IP-SM-GW to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK240tfe2
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length: 0
```

9. **MAP: AnyTimeModification**

The IP-SM-GW sends the request to inform the HSS/HLR that the user with MSISDN "11111111" is ready to receive short messages for delivery via IP via the sender of the request.

For detailed message flows and coding see 3GPP TS 29.002 [11].

Table B.3-7 provides the parameters in the AnyTimeModification request, which are sent to the HSS/HLR.

Table B.3-7: Data update procedure (IP-SM-GW to HSS/HLR)

Message source and destination	MAP Information element name	Information source	Description
IP-SM-GW to HSS/HLR	SubscriberIdentity	MSISDN in SIP REGISTER request	This information element indicates the MSISDN of the subscriber
IP-SM-GW to HSS/HLR	gsmSCF-Address	(static) IP-SM-GW	HSS/HLR should forward messages related to SM delivery to this address
IP-SM-GW to HSS/HLR	modifyRegistrationStatus of the modificationRequestFor-SM-GW-Data	(static) IP-SM-GW	This information element indicates the registration status (activate) towards HSS/HLR

10. MAP: AnyTimeModification response

The HSS/HLR acknowledges the request.

NOTE 2: The positive ATM response (Result message) does not contain any result code, negative response (Error message) contains an error code.

B.4 Signalling flows demonstrating how IP-SM-GW indicates to HSS the unavailability of UE for delivery of short messages

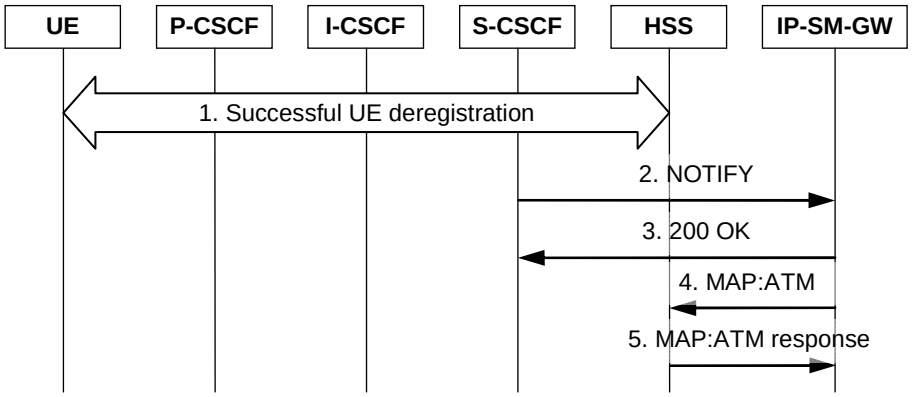

Figure B.4-1: IP-SM-GW deregistration signalling

Figure B.4-1 shows the registration signalling flow for the scenario when IP-SM-GW deregisters to HSS. The details of the signalling flows are as follows:

1. **See 3GPP TS 24.228 [9], subclause 6.2 steps 1 through 22**

   Expires header set to zero. Public user identity deregisters its last SMS capable contact.

NOTE 1: A flow for deregistration is not provided in 3GPP TS 24.228 [9]. However, deregistration is similar to a registration with the Expires header set to zero. Compared to a Rel-5 deregistration additional parameters might appear in a later release.

2. **NOTIFY request (S-CSCF to IP-SM-GW) - see example in table B.4-1**

   The S-CSCF sends a first NOTIFY request to the IP-SM-GW. The notification indicates that the monitored public user identity is not registered any more with an SMS capable UE.

Table B.4-1: NOTIFY request (S-CSCF to IP-SM-GW)

```
NOTIFY sip:ipsmgw.home1.net SIP/2.0
Max-Forwards: 70
From: <sip:scscf1.home1.net>;tag=14142
To: <sip:ipsmgw.home1.net>;tag=31415286
Call-ID: 56uher6y5hrwy5wseg5y4w
CSeq: 222 NOTIFY
Subscription-State: active;expires=234546
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:scscf1.home1.net>
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo" version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="a7" state="terminated">
         <contact id="77" state="terminated" event="unregistered">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
         <contact id="77" state="active" event="registered">
             <uri>sip:[5555::aaa:bbb:ccc:eee]</uri>
         </contact>
     </registration>
</reginfo>
```

3. 200 (OK) response (IP-SM-GW to S-CSCF) - see example in table B.4-2

IP-SM-GW sends a 200 (OK) response to the S-CSCF.

Table B.4-2: 200 (OK) response (IP-SM-GW to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK240tfe2
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length: 0
```

4. **MAP: AnyTimeModification**

The IP-SM-GW sends the request to inform the HSS/HLR that the user with MSISDN "11111111" is not available to receive short messages for delivery via IP via the sender of the request.

For detailed message flows and coding see 3GPP TS 29.002 [11].

Table B.4-3 provides the parameters in the AnyTimeModification request, which are sent to the HSS/HLR.

Table B.4-3: MAP: AnyTimeModification request (IP-SM-GW to HSS/HLR)

Message source and destination	MAP Information element name	Information source	Description
IP-SM-GW to HSS/HLR	SubscriberIdentity	MSISDN in SIP REGISTER request	This information element indicates the MSISDN of the subscriber
IP-SM-GW to HSS/HLR	gsmSCF-Address	(static) IP-SM-GW	HSS/HLR should forward messages related to SM delivery to this address
IP-SM-GW to HSS/HLR	modifyRegistrationStatus of the modificationRequestFor-SM-GW-Data	(static) IP-SM-GW	This information element indicates the registration status (deactivate) towards HSS/HLR.

5. **MAP: AnyTimeModification response**

The HSS/HLR acknowledges the request.

NOTE 2: The positive ATM response (Result message) does not contain any result code; negative response (Error message) contains an error code.

B.5 Signalling flows demonstrating successful UE originated SM submit procedure over IP

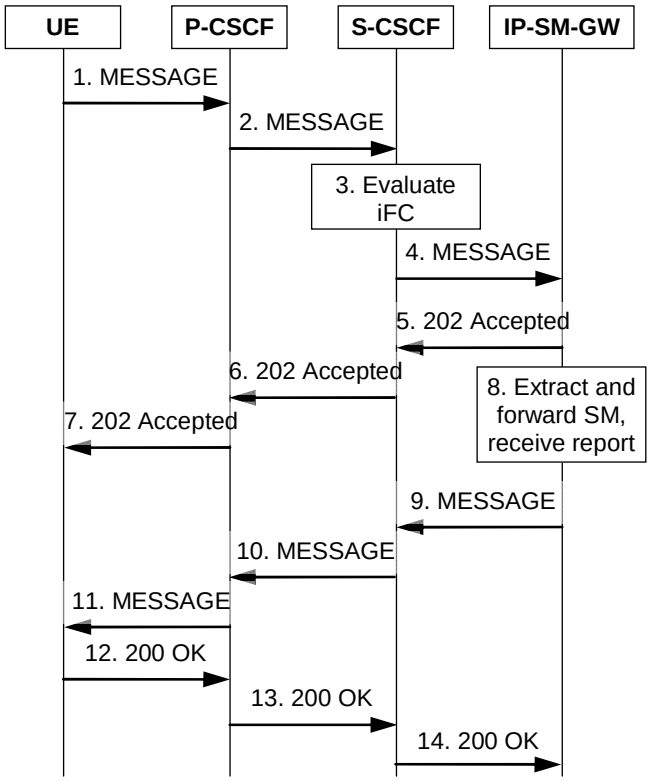

Figure B.5-1: UE originated SM submit procedure over IP signalling

Figure B.5-1 shows a successful UE originated SM over IP submission. For simplicity it is assumed that IP-SM-GW has direct access to SC. The details of the signalling flows are as follows:

1. **MESSAGE request (UE to P-CSCF) - see example in table B.5-1**

   This request includes a vnd.3gpp.sms payload that includes the short message and routing information for the IP-SM-GW to forward the short message.

Table B.5-1: MESSAGE request (UE to P-CSCF)

```
MESSAGE sip:sc.home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:orig@scscf1.home1.net;lr>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
From: <sip:user1_public1@home1.net>; tag=171828
To: <sip:sc.home1.net.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 666 MESSAGE
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

Request-URI: PSI of the SC of user1_public1@home1.net.

The payload includes an RP-DATA message (see 3GPP TS 24.011 [8]). It includes:

- Address of the originating UE: this field includes the length indicator only;
- Address of the destination SC, which is configured in the UE; and
- RP-User-Data (see 3GPP TS 23.040 [3]), which includes SMS-SUBMIT as type indicator.

2. **MESSAGE request (P-CSCF to S-CSCF) - see example in table B.5-2**

Table B.5-2: MESSAGE request (P-CSCF to S-CSCF)

```
MESSAGE sip:sc.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:orig@scscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
From: <sip:user1_public1@home1.net>; tag=171828
To: <sip:sc.home1.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 666 MESSAGE
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

3. **Initial filter criteria**

   The S-CSCF analyses the incoming request against the initial filter criteria and decides to send the SIP MESSAGE request to the IP-SM-GW.

4. **MESSAGE request (S-CSCF to IP-SM-GW) - see example in table B.5-3**

Table B.5-3: MESSAGE request (S-CSCF to IP-SM-GW)

```
MESSAGE sip:sc.home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK344a651, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:ipsmgw.home1.net;lr>, <sip:cb03a0s09a2sdfglkj490333@scscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Asserted-Identity: tel:+12125551111
From: <sip:user1_public1@home1.net>; tag=171828
To: <sip:sc.home1.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 666 MESSAGE
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

5. **202 (Accepted) response (IP-SM-GW to S-CSCF) - see example in table B.5-4**

Table B.5-4: 202 (Accepted) response (IP-SM-GW to S-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK344a651, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
```

6. **202 (Accepted) response (S-CSCF to P-CSCF) - see example in table B.5-5**

Table B.5-5: 202 (Accepted) response (S-CSCF to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
```

7. **202 (Accepted) response (P-CSCF to UE) - see example in table B.5-6**

Table B.5-6: 202 (Accepted) response (P-CSCF to UE)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
```

8. **Extracting and forwarding the short message, waiting and processing report**

The IP-SM-GW forwards the short message TPDU (SMS-SUBMIT) to the SC. The SC returns a submit report which includes SMS-SUBMIT-REPORT as type indicator.

9. **MESSAGE request (IP-SM-GW to S-CSCF) - see example in table B.5-7**

This request includes a vnd.3gpp.sms payload that includes the short message submission report and routing information for the IP-SM-GW to forward the submission report.

Table B.5-7: MESSAGE request (IP-SM-GW to S-CSCF)

```
MESSAGE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP ipsmgw.home1.net; branch=z9hG4bK876ffa3
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From: <sip:ipsmgw.home1.net>; tag=583558
To: <sip:user1_public1@home1.net>
Call-ID: fy365h43g3f36f3f6fth74g3
Cseq: 888 MESSAGE
P-Asserted-Identity: <sip:ipsmgw.home1.net>
In-Reply-to: cb03a0s09a2sdfglkj490333
Request-Disposition:fork,parallel
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

Request-URI: Public user identity receiving the submission report.

The payload includes an RP-ACK message (see 3GPP TS 24.011 [8]). It includes RP-User-Data (see 3GPP TS 23.040 [3]), which includes SMS-SUBMIT-REPORT as type indicator.

10. **MESSAGE request (S-CSCF to P-CSCF) - see example in table B.5-8**

Table B.5-8: MESSAGE request (S-CSCF to P-CSCF)

```
MESSAGE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home1.net;
     branch=z9hG4bK876ffa3
Max-Forwards: 69
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From: <sip:ipsmgw.home1.net>; tag=583558
To: <sip:user1_public1@home1.net>
Call-ID: fy365h43g3f36f3f6fth74g3
Cseq: 888 MESSAGE
P-Asserted-Identity: <sip:ipsmgw.home1.net>
```

```
P-Called-Party-ID: <sip:user1_public1@home1.net>
In-Reply-to: cb03a0s09a2sdfglkj490333
Request-Disposition:fork,parallel
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

11. **MESSAGE request (P-CSCF to UE) - see example in table B.5-9**

Table B.5-9: MESSAGE request (P-CSCF to UE)

```
MESSAGE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK2524fd2, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home1.net; branch=z9hG4bK876ffa3
Max-Forwards: 68
From: <sip:ipsmgw.home1.net>; tag=583558
To: <sip:user1_public1@home1.net>
Call-ID: fy365h43g3f36f3f6fth74g3
Cseq: 888 MESSAGE
P-Called-Party-ID: <sip:user1_public1@home1.net>
In-Reply-to: cb03a0s09a2sdfglkj490333
Request-Disposition:fork,parallel
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

12. **200 (OK) response (IP-SM-GW to S-CSCF) - see example in table B.5-10**

Table B.5-10: 200 (OK) response (UE to P-S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK2524fd2, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home1.net; branch=z9hG4bK876ffa3
From:
To:
Call-ID:
Cseq:
```

13. **200 (OK) response (P-CSCF to S-CSCF) - see example in table B.5-11**

Table B.5-11: 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home1.net;
     branch=z9hG4bK876ffa3
From:
To:
Call-ID:
Cseq:
```

14. **200 (OK) response (S-CSCF to IP-SM-GW) - see example in table B.5-12**

Table B.5-12: 200 (OK) response (S-CSCF to IP-SM-GW)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ipsmgw.home1.net; branch=z9hG4bK876ffa3
From:
To:
Call-ID:
Cseq:
```

B.6 Signalling flows demonstrating successful UE terminated SM deliver procedure over IP (including delivery report)

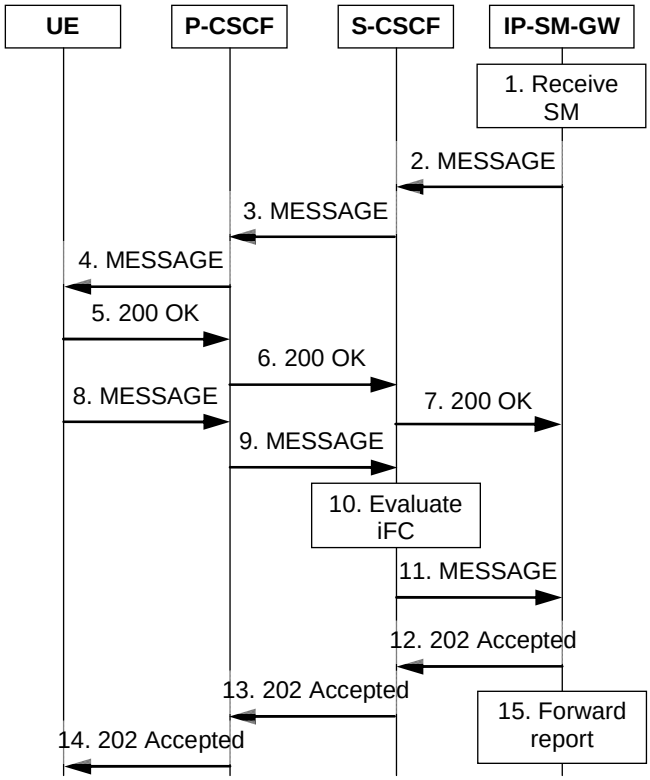

Figure B.6-1: UE originated SM deliver procedure over IP signalling

It is assumed that "sip:user2_public2@home2.net" associated with MSISDN=11111111 is registered at ipsmgw.home2.net using an SMS capable UE.

Figure B.6-1 shows a successful UE terminated SM over IP delivery. The details of the signalling flows are as follows:

1. **Receiving SM from SC**

   The IP-SM-GW receives a short message from SC (sc.home1.net) which includes SMS-DELIVER as type indicator and MSISDN=11111111 as destination UE.

2. **MESSAGE request (IP-SM-GW to S-CSCF) - see example in table B.6-1**

   This request includes a vnd.3gpp.sms payload that includes the short message and routing information for the S-CSCF to forward the short message.

Table B.6-1: MESSAGE request (IP-SM-GW to S-CSCF)

```
MESSAGE sip:user2_public2@home2.net SIP/2.0
Via: SIP/2.0/UDP ipsmgw.home2.net; branch=z9hG4bK876ffa3
Max-Forwards: 70
Route: <sip:scscf1.home2.net;lr>
From: <sip:ipsmgw.home2.net>; tag=583558
To: <sip:user2_public2@home2.net>
Call-ID: fy365h43g3f36f3f6fth74g3
Cseq: 888 MESSAGE
P-Asserted-Identity: sip:ipsmgw.home2.net
Request-Disposition: no-fork
Accept-Contact: *;+g.3gpp.smsip;require;explicit
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

Request-URI: Public user identity receiving the delivery report.

The payload includes the RP-DATA message (see 3GPP TS 24.011 [8]). Its RP-User-Data information element includes a TPDU of type SMS-DELIVER.

3. **MESSAGE request (S-CSCF to P-CSCF) - see example in table B.6-2**

S-CSCF performs the caller preferences to callee capabilities matching and builds the Request-URI with the selected contact.

Table B.6-2: MESSAGE request (S-CSCF to P-CSCF)

```
MESSAGE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home2.net;
     branch=z9hG4bK876ffa3
Max-Forwards: 69
Route: <sip:pcscf2.visited2.net:7531;lr;comp=sigcomp>
From: <sip:ipsmgw.home2.net>; tag=583558
To: <sip:user2_public2@home2.net>
Call-ID: fy365h43g3f36f3f6fth74g3
Cseq: 888 MESSAGE
P-Asserted-Identity: sip:ipsmgw.home2.net
P-Called-Party-ID: <sip:user2_public2@home2.net>
Request-Disposition: no-fork
Accept-Contact: *;+g.3gpp.smsip;require;explicit
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

Request-URI: SMS capable contact of the public user identity.

4. **MESSAGE request (P-CSCF to UE) - see example in table B.6-3**

Table B.6-3: MESSAGE request (P-CSCF to UE)

```
MESSAGE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net;branch=z9hG4bK2524fd2, SIP/2.0/UDP
     scscf2.home2.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home2.net; branch=z9hG4bK876ffa3
Max-Forwards: 68
From: <sip:ipsmgw.home2.net>; tag=583558
To: <sip:user2_public2@home2.net>
Call-ID: fy365h43g3f36f3f6fth74g3
Cseq: 888 MESSAGE
P-Called-Party-ID: <sip:user2_public2@home2.net>
Request-Disposition: no-fork
Accept-Contact: *;+g.3gpp.smsip;require;explicit
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

5. **200 (OK) response (UE to P-CSCF) - see example in table B.6-4**

Table B.6-4: 200 (OK) response (UE to P-S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net;branch=z9hG4bK2524fd2, SIP/2.0/UDP
     scscf2.home2.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home2.net; branch=z9hG4bK876ffa3
From:
To:
Call-ID:
Cseq:
```

6. **200 (OK) response (P-CSCF to S-CSCF) - see example in table B.6-5**

Table B.6-5: 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK344a651, SIP/2.0/UDP ipsmgw.home2.net;
     branch=z9hG4bK876ffa3
From:
To:
Call-ID:
Cseq:
```

7. **200 (OK) response (S-CSCF to IP-SM-GW) - see example in table B.6-6**

Table B.6-6: 200 (OK) response (S-CSCF to IP-SM-GW)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ipsmgw.home2.net; branch=z9hG4bK876ffa3
From:
To:
Call-ID:
Cseq:
```

8. **MESSAGE request (UE to P-CSCF) - see example in table B.6-7**

This request includes a vnd.3gpp.sms payload that includes the SMS-DELIVER-REPORT and routing information for the IP-SM-GW to forward the delivery report.

Table B.6-7: MESSAGE request (UE to P-CSCF)

```
MESSAGE sip:ipsmgw.home2.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf2.visited2.net:7531;lr;comp=sigcomp>, <sip:orig@scscf2.home2.net;lr>
P-Preferred-Identity: "John Doe" <sip:user2_public2@home2.net>
From: <sip:user2_public2@home2.net>; tag=171828
To: <sip:ipsmgw.home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
In-Reply-to: fy365h43g3f36f3f6fth74g3
Cseq: 999 MESSAGE
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

Request-URI: The IP-SM-GW that sent the SIP MESSAGE request including the delivered short message to the SM-over-IP receiver.

The payload includes an RP-ACK message (see 3GPP TS 24.011 [8]). Its RP-User-Data information element includes a TPDU of type SMS-DELIVER-REPORT.

9. **MESSAGE request (P-CSCF to S-CSCF) - see example in table B.6-8**

Table B.6-8: MESSAGE request (P-CSCF to S-CSCF)

```
MESSAGE sip:ipsmgw.home2.net SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:orig@scscf2.home2.net;lr>
P-Asserted-Identity: "John Doe" <sip:user2_public2@home1.net>
From: <sip:user2_public2@home2.net>; tag=171828
To: <sip:ipsmgw.home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
In-Reply-to: fy365h43g3f36f3f6fth74g3
Cseq: 999 MESSAGE
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

10. **Initial filter criteria**

The S-CSCF analyses the incoming request against the initial filter criteria and decides to send the SIP MESSAGE request to the IP-SM-GW.

11. **MESSAGE request (S-CSCF to IP-SM-GW) - see example in table B.6-9**

Table B.6-9: MESSAGE request (S-CSCF to IP-SM-GW)

```
MESSAGE sip:ipsmgw.home2.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK344a651, SIP/2.0/UDP
     pcscf2.visited2.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:ipsmgw.home2.net;lr>, <sip:cb03a0s09a2sdfglkj490333@scscf2.home2.net;lr>
P-Asserted-Identity: "John Doe" <sip:user2_public2@home2.net>
P-Asserted-Identity: tel:+12125552222
From: <sip:user2_public2@home2.net>; tag=171828
To: <sip:ipsmgw.home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
In-Reply-to: fy365h43g3f36f3f6fth74g3
Cseq: 666 MESSAGE
Content-Type: application/vnd.3gpp.sms
Content-Length: (…)
```

12. **202 (Accepted) response (IP-SM-GW to S-CSCF) - see example in table B.6-10**

Table B.6-10: 202 (Accepted) response (IP-SM-GW to S-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK344a651, SIP/2.0/UDP
     pcscf2.visited2.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
```

13. **202 (Accepted) response (S-CSCF to P-CSCF) - see example in table B.6-11**

Table B.6-11: 202 (Accepted) response (S-CSCF to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf2.visited2.net;branch=z9hG4bK240f341, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
```

14. **202 (Accepted) response (P-CSCF to UE) - see example in table B.6-12**

Table B.6-12: 202 (Accepted) response (P-CSCF to UE)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp; branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
```

15. **Extracting and forwarding the delivery report**

The IP-SM-GW forwards the short message TPDU (SMS-DELIVER-REPORT) to the SC.

Annex C (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2006-05					Initial version		
2006-05					Version 0.1.0 incorporating results of CT1 discussions at CT1 #42. Agreed documents: C1-061049 (revised TS skeleton), C1-061050, C1-061052, C1-061053, and C1-061067.		
2006-07					Version 0.2.0 incorporating results of CT1 discussions at CT1 #42bis. Agreed documents: C1-061140, C1-061329, C1-061330, C1-061333, C1-061334, C1-061335, C1-061353, C1-061354, C1-061359, and C1-061360.		
2006-09					Version 0.3.0 incorporating results of CT1 discussions at CT1 #43. Agreed documents: C1-061429, C1-061431, C1-061546, C1-061567, C1-061635, C1-061787, C1-061788, C1-061789, C1-061790, and C1-061791.	0.2.0	0.3.0
2006-11					Version 0.4.0 incorporating results of CT1 discussions at CT1 #44. Agreed documents: C1-062055, C1-062182, C1-062218, C1-062224, C1-062384, C1-062385, C1-062386, C1-062387, C1-062388, C1-062389, C1-062391, and C1-062432.	0.3.0	0.4.0
2006-11					Version 1.0.0 created by MCC for presentation of the TS to TSG	0.4.0	1.0.0
2007-02					Version 1.1.0 incorporating results of CT1 discussions at CT1 #45. Agreed documents: C1-070331, C1-070334, C1-070335, C1-070338, C1-070543, C1-070545, C1-070546, and C1-070637.	1.0.0	1.1.0
2007-02					Version 2.0.0 created by MCC	1.1.0	2.0.0
2007-03					Version 7.0.0 created by MCC	2.0.0	7.0.0
2007-06	CT#36	CP-070384	0017	1	Adding status report procedure, forking related corrections plus editorial changes	7.0.0	7.1.0
2007-06	CT#36	CP-070384	0015	1	P-Asserted-Identity corrections	7.0.0	7.1.0
2007-06	CT#36	CP-070384	0010	1	IP-SM-GW as Request-URI for delivery report	7.0.0	7.1.0
2007-06	CT#36	CP-070384	0008	1	SC as Request-URI for short message submit	7.0.0	7.1.0
2007-06	CT#36	CP-070384	0005	-	Correction of text on media feature tag g.3gpp.smsip	7.0.0	7.1.0
2007-06	CT#36	CP-070384	0002	1	Corrections to example flows	7.0.0	7.1.0
2007-12	CT#38	CP-070801	0018		Feature tag for SMSIP registered by IANA	7.1.0	7.2.0
2007-12	CT#38	CP-070801	0019	1	Miscellaneous corrections	7.1.0	7.2.0
2008-12	CT#42				Upgrade to Rel-8	7.2.0	8.0.0
2009-03	CT#43	CP-090122	0022	1	SRI4SM handling in IP-SM-GW	8.0.0	8.1.0
2009-09	CT#45	CP-090655	0024	2	Support of operator preference for domain selection of SMS	8.1.0	8.2.0
2009-12	CT#46	CP-090897	0028	1	Correction to 'Submitting a short message' for a SM-over-IP sender	8.2.0	8.3.0
2009-12	CT#46	CP-090923	0026	1	SM termination and deregistration corrections	8.3.0	9.0.0
2010-06	CT#48	CP-100338	0032	2	Resolving EN	9.0.0	9.1.0
2010-12	CT#50	CP-100741	0034	8	Obtaining the PSI of the SC	9.1.0	9.2.0
2011-03	CT#51				Upgrade to Rel-10	9.2.0	10.0.0
2011-09	CT#53	CP-110694	0035	1	Correcting errors in the B.5 example	10.0.0	11.0.0
2012-06	CT#56	CP-120307	0041		IP-SM-GW registration/de-registration	11.0.0	11.1.0
2012-06	CT#56	CP-120307	0042	2	Correlation of SIP MESSAGE in UE terminated SM deliver procedure over IP	11.0.0	11.1.0
2012-12	CT#58	CP-120803	0043	3	Terminating SMS to MSISDNless UE	11.1.0	11.2.0
2012-12	CT#58	CP-120793	0044	1	User error parameter in delivery report to SC	11.1.0	11.2.0

History

Document history		
V11.1.0	November 2012	Publication
V11.2.0	January 2013	Publication