SMS Interworking with OMA Instant Messaging

CONTENTS

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

LIST OF FIGURES

LIST OF TABLES

REVISION HISTORY

Revision	Date	Remarks
0.1	1/25/2010	X30-20091102-003 SMS IM interworking outline-stage 2 -- intro-scope-ref-def-r2.zip
0.1	1/25/2010	X30-20091207-004R1 SMS IM interworking outline-stage 2 -- SendtermSMS-TermIM-r2.zip
0.1	1/25/2010	X30-20091207-005R1 SMS IM interworking outline-stage 2 -- Trans and serv IW-r1.zip
0.1	1/25/2010	X30-20091207-007R2 SMS IM interworking outline-stage 2 -- Arch Mod-Req-flow Reg-Dereg.zip
0.2	3/1/2010	X30-20100125-005R2 SMS IM interworking outline-stage 2 - Spec.zip
0.2	3/1/2010	X30-20100125-006R1 SMS IM transport service level interworking.zip
0.2	3/1/2010	X30-20100125-007 SMS IM stage2.zip
0.3	4/26/2010	X30-20100301-006R1 Regis Flow.doc
0.3	4/26/2010	X30-20100301-008 change sections order.doc
0.3	4/26/2010	X30-20100301-010R2 UE Roles.doc
0.3	4/26/2010	X30-20100301-012R1 GW Roles Notif UE Stat.doc
0.3	4/26/2010	X30-20100301-013R2 GW Roles Rout Info.doc
0.3	4/26/2010	X30-20100301-014R4 GW Roles IM-SMS Orig Net-v01.doc
0.4	6/03/2010	X30-20100426-005R2 [Qualcomm] SMS-GW Roles When Service Level Interworking.doc
0.4	6/03/2010	X30-20100426-006R1 [Qualcomm] SMS-GW Roles When Service Level Interworking.doc
0.4	6/03/2010	X30-20100426-007R2 [Qualcomm] SMS-GW Roles When Service Level Interworking.doc
0.5	6/21/2010	X30-20100603-004 SMS-GW .doc
0.5	6/21/2010	X30-20100603-005R1 SMS-GW Roles SMS-IM inetworking.doc
0.5	6/21/2010	X30-20100603-006R8 SMS-GW Roles When Service Level Interworking-Orig NW.doc
0.6	7/27/2010	X30-20100621-004R1 IM user receives large SMS .doc
0.6	7/27/2010	X30-20100621-005R3 [E, Q] SMS-GW Roles SMS-IM Interworking.doc
0.6	7/27/2010	X30-20100621-006R5 SMS-GW Roles When Service Level Interworking-Orig NW.doc
0.6	7/27/2010	X30-20100621-007R4 [E, Q] SMS-GW TRoles When Service Level Interworking--Term NW.doc
0.6	7/27/2010	X30-20100621-009R1 [E, Q] SMS-GW Roles When Service Level Interworking--Term NW.doc

0.7	9/13/2010	X30-20100727-003R1 sending IMDN.doc
0.7	9/13/2010	X30-20100727-004R1 Removal Edit Notes.doc
0.8	9/15/10	X30-20100913-004 [QC] SMS-IM Editorial.doc
0.8	9/15/10	X30-20100913-005R2 [QC] SMS-IM removal of Editorial note.doc
0.8	9/15/10	X30-20100913-014R1 [E] Enhancements of Section 6.5.doc
0.9	10/25/10	X30-20101025-003 [QC] SMS-IM sec 6.5.doc
1.0	12/10/10	X30-20101206-019R2 [QC] Comments SMS-IM Interworking R&F.doc

FOREWORD

(This foreword is not part of this Standard.)

1   Introduction

This specification is for the interworking between 3GPP2 Short Message Sevices (SMS) and OMA SIMPLE IM service.

1.1   Scope

This document specifies the capabilities needed to support the service level interworking between the Short Message Service as defined in the [X.S0048] and the Instant Messaging service as defined in [OMASIMPLE]. The features supported from the [OMASIMPLE] specification are limited to the exchange of short or large immediate messages in pager mode.

NOTE: The page-mode immediate message as defined in [TS 24.247] is considered as a subset of [OMASIMPLE].

2   References

2.1   Normative References

[OMASIMPLE] OMA: "Instant Messaging using SIMPLE", OMA-TS-SIMPLE_IM-V1_0-20070816-C, http://member.openmobilealliance.org/ftp/Public_documents/MWG/IM/Permanent_documents/OMA-TS-SIMPLE_IM-V1_0-20070816-C.zip.

[RFC5438]   IETF RFC 5438: "Instant Message Disposition Notification".

[X.S0048]   3GPP2 X.S0048-0: "Short Message Service (SMS) over IMS", November 2007.

[TS 24.247] 3GPP TS 24.247: "Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".

[C.S0015]   3GPP2 C.S0015-B: "Short Message Service (SMS) for Wideband Spread Sprectrum Systems", May 2004.

[XS0004-540E] 3GPP2 X.S0004-540E: "Mobile Application Part (MAP) – OPERATIONS SIGNALING PROTOCOL".

[TS 29.329] 3GPP TS 29.329: "Sh interface based on the Diameter protocol; Protocol details".

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

[RFC3428]   IETF RFC 3428: "Session Initiation Protocol (SIP) Extension for Instant Messaging".

[RFC4975]   IETF RFC 4975: "The Message Session Relay Protocol (MSRP)".

[XS0004-550-E] 3GPP2 X.S0004-550-E: "Mobile Application Part (MAP) – PARAMETERS SIGNALING PROTOCOLS".

[A.S0014]   3GPP2 A.S0014-D v2.0: "Interoperability Specification (IOS) for cdma2000 Access Network Interfaces — Part 4 (A1, A1p, A2, and A5 Interfaces), August 2009.

3   Definitions, Symbols and Abbreviations

3.1   Definitions

CPIM: Common Presence and Instant Message.

IM origination: origination of an Instant Message by an IMS UE.

IM termination: termination of an Instant Message by an IMS UE.

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

Instant Message: an Instant Message as defined in the [OMASIMPLE] and [TS 24.247].

PSI: Public Service Identity.

SIMPLE IM service: the Instant Messaging Service as defined in the [OMASIMPLE].

SM origination: origination of a Short Message (including SMS over IP) by an SMS capable UE, as defined in [X.S0048].

SM termination: termination of a Short Message (including SMS over IP) by an SMS capable UE, as defined in [X.S0048].

SMS: the Short Message Service as defined in the [C.S0015].

SMSIP MESSAGE: an immediate message as defined in [X.S0048], which encapsulates a SM in its text body.

SMSIP UE: a UE which supports SMSIP MESSAGE.

SMS-over-IMS: the encapsulation of an SMS in a SIP MESSAGE.

WEMT: Wireless Enhanced Messaging Teleservice.

4   Architectural Requirements

This specification covers the service-level interworking with the following requirements:

- The service-level interworking is a value added service which requires service subscription. In addition, it shall also be able to take the operator's policy into account, e.g. checking on the barring setting of the subscriber to determine whether to provide this interworking or not, so the service authorization shall be supported before the interworking is executed.

- The service-level interworking applies as a fallback only if the users cannot communicate with each other using their chosen messaging service according to the user preference and operator policy. The location of the interworking service can be in the originating network and in the terminating network.

- The service-level interworking shall support interworking between OMA SIMPLE IM service as defined in [OMASIMPLE] and Short Message Service, as defined in the [C.S0015] and in the current specification.

- The service-level interworking shall be able to take the capability of the terminating UE into account when possible.

- The service-level interworking shall minimize the impact on the IMS architecture.

- The service-level interworking shall not impact existing functionality of the Short Message Service as described in [C.S0015] or of the SIMPLE IM service enabler as described in [OMASIMPLE]. Existing security mechanisms for both the SIMPLE IM service and the Short Message Service shall be reused.

- The interworking function shall be aware if the message should be interworked or not, e.g. specific types of Short Messages such as an over the air configuration message, shall not be interworked at service-level, but shall be instead transported as a Short Message via IMS as specified in [TS 24.247] or a Short Message via CS as specified in [C.S0015].

- If an SMS user requests an SMS delivery report that the message was delivered to the recipient, then an SMS delivery report shall be generated when the message is delivered using Instant Message.

- If an IMS user requests a notification that the message was delivered to the recipient, an SMS delivery report shall be generated when the message is delivered to the SMS user's client.

- The interworking functionality shall be executed in the following cases:

  - Originating network:

    - The sender is an IM user has subscribed to the interworking function and the recipient is not routable in IMS;

    - The operator policy on the originating side has been set to send the Instant Messages via Short Message Service.

  - Terminating network:

    - The user preferences and/or the operator policy of the recipient have been set to receive the incoming Instant Messages via Short Message Service;

    - The received message is a Short Message and the recipient is an IM user and has subscribed to the interworking service.

4

NOTE: For ensuring the integrity of the response messages from the IM UE, it is strongly recommended that in networks where the GW is deployed, no intermediate nodes modify or terminate the message between the GW and the terminating IM UE. If intermediate nodes are deployed, they can send response messages that do not reflect the final response from the IM UE. Final responses from the IM UE are necessary to ensure correct charging and delivery reports on the Short Message Service side.

5   Architecture model and reference points

5.1   Reference architecture

Figure 5.1 below shows the overall architecture for providing inteworking between SMS and IM

Figure 5.1: Architecture for providing interworking between SMS and IM

5.2   Interfaces

5.2.1   SMS-GW/S-CSCF (ISC)

The ISC interface allows the SMS-GW/S-CSCF to forward the receiving message to the SIP based UE via IMS core.

5.2.2   SMS-GW/HSS (Sh)

The SMS-GW interfaces to the HSS via an Sh interface, to obtain subscriber's registration status and S-CSCF's name.

5.2.3   SMS-GW/[MSC/MSCe] (MAP)

The SMS-GW/[MSC/MSCe] interface allows the SMS-GW to connect to the MSC/MSCe using MAP, and appearing to the MSC/MSCe as an MSC/MSCe.

5.2.4   SMS-GW/HLR(MAP)

The SMS-GW/HLR interface allows the SMS-GW to obtain subscriber's SMS address from the HLR using MAP.

5.3   Functional Entities

5.3.1   SMS-GW

The functions of the SMS-GW when service-level interworking is done between Short Messages and Instant Messages in IMS are:

-    to determine whether to transform the message format or not, and to perform the transformation of the message format when determined.

-    to perform the authorization for service-level interworking.

6   Call Flows

6.1   General

The section describes the procedures for the support of the service-level interworking for the Short Message Service as defined in [C.S0015] and Instant Messaging service as defined in [OMASIMPLE].

NOTE: In the procedures in the following subclauses, the I-CSCF, P-CSCF and ASs such as IM AS are not shown in the figures.

6.2   SMS-GW IMS 3rd Party Registration call flow

This call flow shall be according to the procedures described in [X.S0048].

6.3   Interaction between transport-level and service-level interworking with interworking in the originating side

6.3.1   General

The interaction between transport-level interworking (between SMS over CS and SMS over IMS) and service-level interworking (between Instant Messaging and SMS) depends on the user subscription and authorisation, on the UE capabilities, and on operator policy.

If a user is only subscribed to either transport-level interworking or service-level interworking, only procedures defined for the subscribed interworking type may be performed.

If a user is subscribed to both transport-level interworking and service-level interworking, but the user is only authorized for one of the interworking types when the message is processed, only the authorized interworking may be performed.

If a user is subscribed to both transport-level interworking and service-level interworking, and the user is authorized for both types, the behavior of the SMS-GW depends on the specific scenario, on the registered capabilities of the UE, and finally is defined by operator policy and user preferences.

For a user subscribed to service-level interworking, two Application Servers in the network are normally called upon to handle an Instant Message:

-        the IM AS, defined in [OMASIMPLE];

-        the SMS-GW.

The following sections describe the different interaction scenarios.

6.3.2   IMS Originating

In the originating network, a UE sends a SIP MESSAGE (Encapsulated Short Message or Instant Message). The originating S-CSCF forwards the SIP MESSAGE to the SMS-GW based on the iFC. If there is no subscription for the interworking service, the SMS-GW is not included in the iFC and the S-CSCF continues with the subsequent iFC check. After all the originating iFC triggers have been handled, the S-CSCF attempts to route the SIP MESSAGE to the terminating IMS network. If it fails, an error is returned to the sender.

NOTE 1: If an IM AS is present in the network, Instant Messages are routed to it before going to the SMS-GW.

NOTE 2: An encapsulated Short Message uses the PSI of the Message Center as the Request-URI. If the user is not subscribed to transport-level interworking and the SMS-GW is not invoked, the ENUM query fails, and an error is returned to the sender. How the UE is provided with the PSI of the Message Center is outside the scope of this document.

When the SMS-GW receives the SIP MESSAGE, it shall decide which interworking is performed based on the content of the received SIP MESSAGE, as the SMS-GW can distinguish between an encapsulated Short Message and an Instant Message. If an encapsulated Short Message is received and if the subscriber is authorized for the transport-level interworking, the SMS-GW maps the encapsulated Short Message to a Short Message. Similarly, when an Instant Message is received, the SMS-GW determines whether the Instant Message is routable in IMS. If the Instant Message is not routable in IMS and the service level interworking is authorized, the SMS-GW shall perform the service-level interworking.
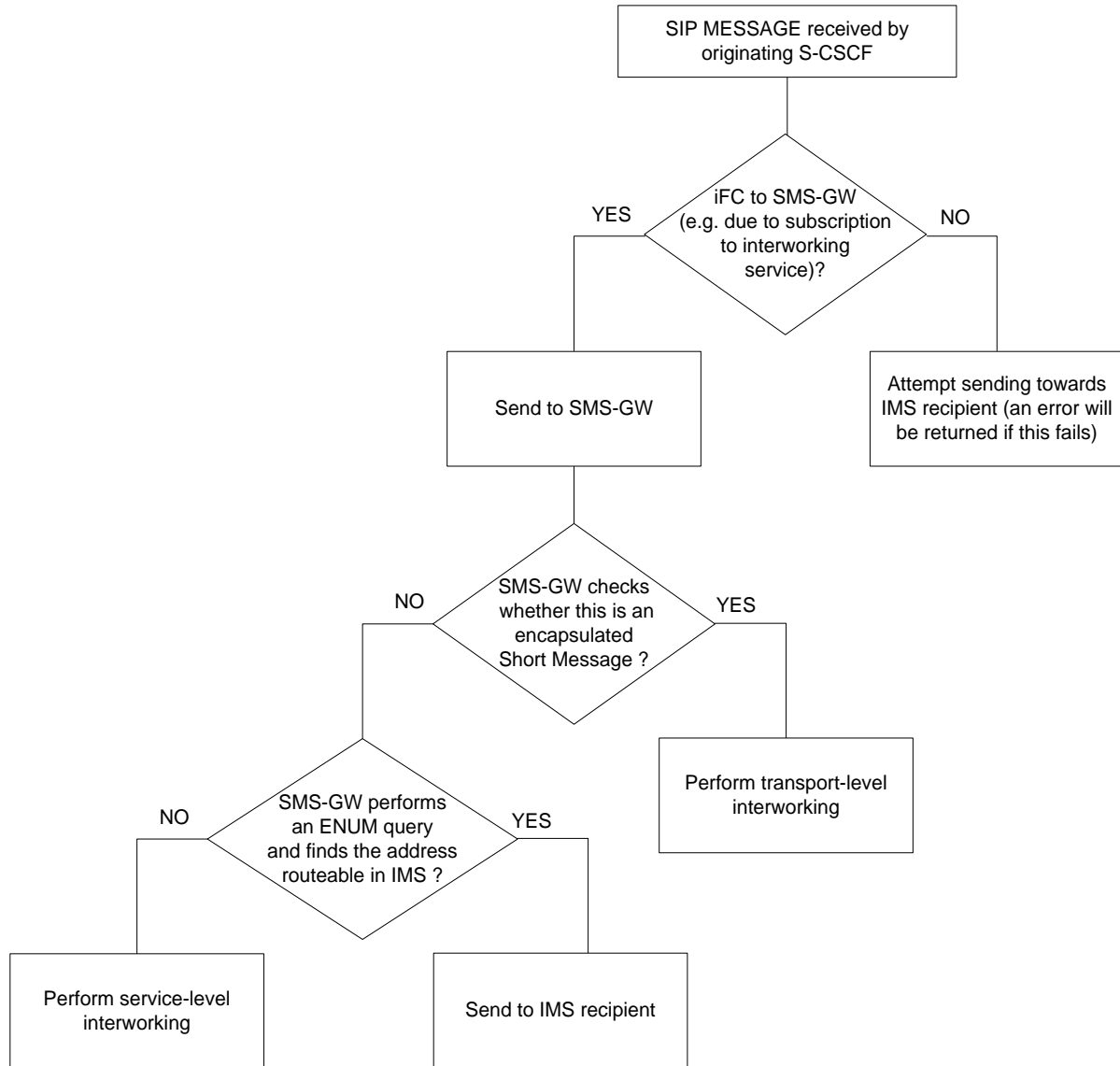
```
                    ┌─────────────────────────┐
                    │  SIP MESSAGE received by │        1
                    │   originating S-CSCF     │        2
                    └─────────────────────────┘        3
                                                        4
                                                        5
                             ◇                          6
                        iFC to SMS-GW                   7
            YES     (e.g. due to subscription   NO      8
                        to interworking                 9
                          service)?                    10
                                                       11
                                                       12
                                                       13
        ┌──────────────────┐      ┌──────────────────┐ 14
        │                  │      │ Attempt sending   │ 15
        │  Send to SMS-GW  │      │ towards IMS       │ 16
        │                  │      │ recipient (an     │ 17
        └──────────────────┘      │ error will be     │
                                  │ returned if this  │ 18
                                  │ fails)            │ 19
                                  └──────────────────┘ 20
                                                       21
                      ◇                                22
                 SMS-GW checks                         23
         NO    whether this is an   YES                24
                 encapsulated                          25
                Short Message ?                        26
                                                       27
                                  ┌──────────────────┐ 28
                                  │ Perform           │ 29
                                  │ transport-level   │ 30
                                  │ interworking      │ 31
                                  └──────────────────┘ 32
              ◇                                        33
        SMS-GW performs                                34
  NO    an ENUM query     YES                          35
        and finds the address                          36
        routeable in IMS ?                             37
                                                       38
  ┌──────────────────┐  ┌──────────────────┐           39
  │ Perform          │  │                  │           40
  │ service-level    │  │ Send to IMS      │           41
  │ interworking     │  │ recipient        │           42
  └──────────────────┘  └──────────────────┘           43
```

Figure 6.3.2: Performing interworking service on originating side

6.3.3   IMS Terminating

When the SMS-GW receives a Short Message from the legacy network on the terminating side, it performs the domain selection to determine the preferred domain to transfer the Short Message. If the selected network is IMS, the SMS-GW will determine whether the transport level interworking or the service level interworking is to be preformed based on the users' subscription and authorization, and on the UE capability as indicated during IMS registration. If the user has subscribed to both services, is authorized for both and the UE has indicated its capability to receive both encapsulated Short Messages and Instant Messages, the priority between the transport-level interworking and the service-level interworking is based on operator policy and user preferences.

NOTE: If the incoming Short Message is interworked to an Instant Message, the resulting Instant Message could be routed to the IM AS before being sent to the UE.
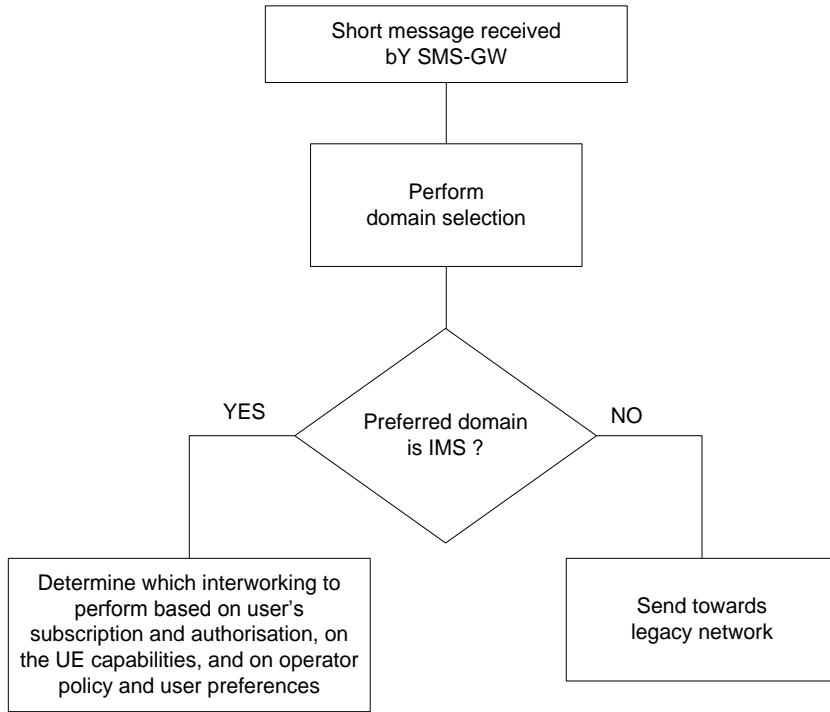
Figure 6.3.3: Performing interworking service on terminating side for an incoming Short Message

6.4 IM capable UE sends an Instant Message to an SMS user with interworking in the originating side
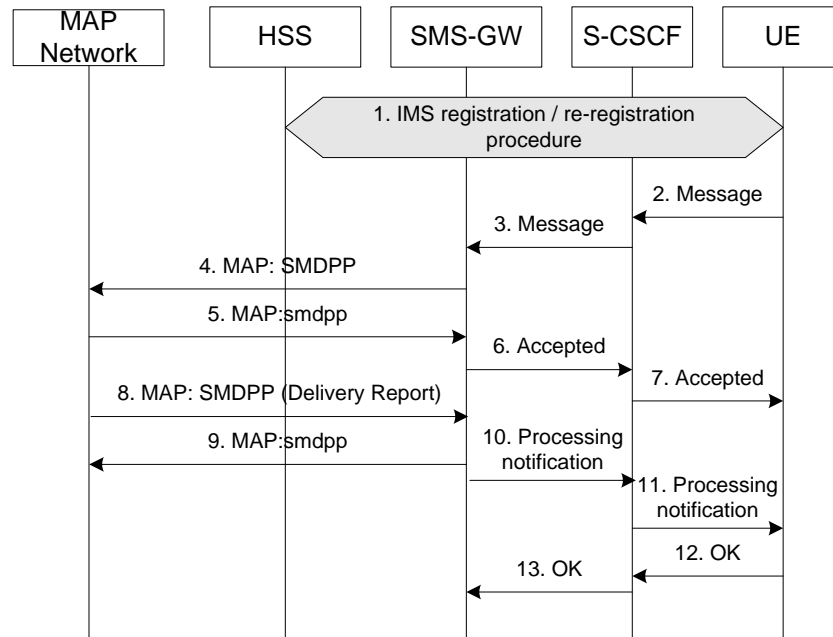

Figure 6.4: Successful IM origination to SMS procedure

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

2) UE submits the Instant Message to the S-CSCF using an appropriate SIP method. The UE may request to hide its Public User Identity from the recipient within the Instant Message, as described in [OMASIMPLE].

3) S-CSCF forwards the Instant Message toSMS-GW based on stored iFC.

NOTE 1: Subscribers with no subscription for service level interworking will not be provided with the relevant iFCs.

4) The SMS-GW shall decide whether to perform service-level interworking depending on SIP request header field (e.g. Request-URI), operator policy, when the Instant Message is not routable in the IMS. If the service-level interworking is authorized, the originating UE's SMS-GW delivers the SMS message to the terminating SMS-GW in a MAP SMDPP message. The terminating SMS-GW is not shown for brevity.

5) The terminating SMS-GW responds by sending a MAP smdpp message back to the sender of the MAP SMDPP message.

6) If service authorization is successful, the SMS-GW acknowledges the Instant Message.

7) Instant Message acknowledgement is forwarded by S-CSCF to UE.

NOTE 2: Steps 6 and 7 can occur anytime after the subscriber authorization check has been performed by the SMS-GW.

8) The terminating SMS-GW acknowledges message delivery to the MS by sending MAP: SMDPP (Delivery Report).

9) The originating SMS-GW responds by sending a MAP smdpp message back to the sender of the MAP SMDPP message.

10) SMS-GW translates the received Delivery report to an appropriate Instant Message, and forwards it to the S-CSCF. If the SMS-GW sent concatenated Short Messages to terminating SMS-GW in step 4, the SMS-GW should wait for the last Delivery Report, and translate the last Delivery Report to an appropriate Instant Message, and forward it to the S-CSCF.

11) S-CSCF sends the translated Instant Message to the UE.

12) UE acknowledges the translated Instant Message.

13) Acknowledgement of the translated Instant Message is forwarded by S-CSCF to SMS-GW.

6.5 IM capable UE sends an Instant Message to an SMS user with interworking in the terminating side

This procedure describes the delivery of an Instant Message to a registered IMS subscriber that is presently being served by a 1xRTT network.

12
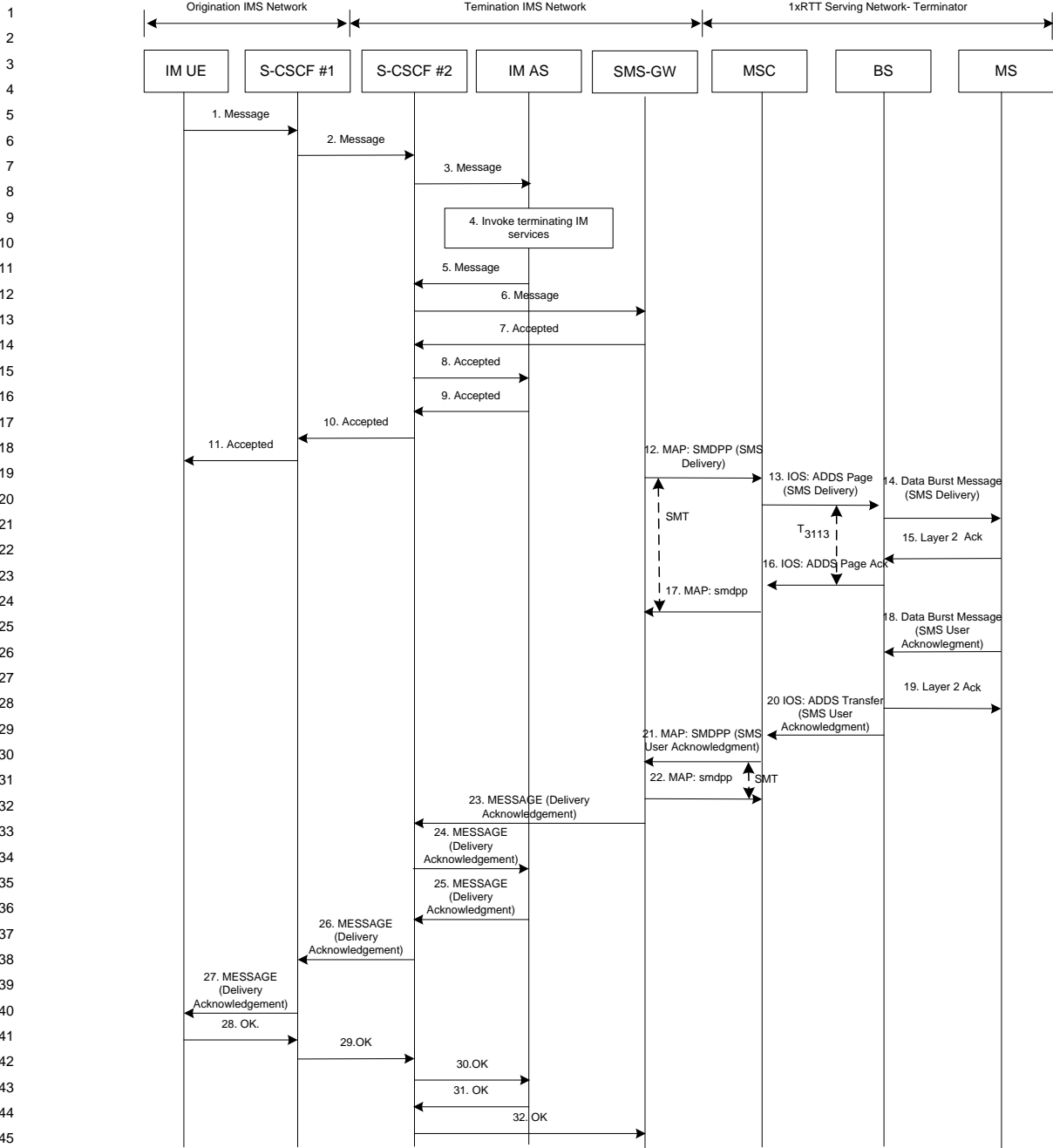
Figure 6.5: Successful IM terminating to SMS procedure with interworking in the Terminating Side

1) UE submits an Instant Message, destined to another IM user in another IMS domain, using an appropriate SIP method. The UE may request to hide its Public User Identity from the recipient within the Instant Message, as described in [OMASIMPLE].

2) The S-CSCF resolves the destination domain and routes the message towards the S-CSCF in the terminating network ("Terminating S-CSCF").

3) The terminating S-CSCF forwards the Instant Message to the IM AS ("Terminating IM AS") based on stored iFC.

NOTE: Depending on iFC configuration, it is possible that the IM AS is not triggered for the unregistered subscribers.

4) The terminating IM AS invokes terminating IM services as applicable for the destination IM user.

5) The IM AS can forward the Instant Message back to the terminating S-CSCF, e.g. the terminating IM user is offline.

6) The terminating S-CSCF forwards the Instant Message to the SMS-GW, e.g. based on stored iFC.

7-11)The SMS-GW sends Accepted towards the IM capable UE to indicate that the Instant Message has been accepted for further processing.

12)The SMS-GW performs service level interworking of the received instant message (step 11). After the service level interworking, the SMS-GW sends a MAP SMDPP Invoke message to the Serving MSC and starts timer SMT. The MAP SMDPP Invoke message containing the SMS Delivery message [C.S0015] in the SMS_BearData Parameter.

13)The MSC sends an ADDS Page message [A.S0014] to the BS. The ADDS Page message contains the SMS Delivery message in the ADDS User Part information element.

 If the MSC requires an acknowledgment, it includes the Tag information element in the ADDS Page message and starts timer T3113.

14)The BS sends the SMS Delivery Message to the MS on the Paging Channel or the Forward Common Control Channel. Before sending the short message, the BS may perform vendor specific procedures such as paging the MS to determine the cell in which the MS is located.

15)If a Layer 2 Ack was solicited in the Data Burst Message (Step 14), the MS acknowledges the receipt of the message by a Layer 2 Ack.

16)If the MSC requested an acknowledgment by including the Tag information element in the ADDS Page message (step 13), the BS replies with an ADDS Page Ack message including the Tag information element set identical to the value sent by the MSC (step 13). If timer T3113 was previously started, it is now stopped.

17)The MSC acknowledges the MAP SMDPP invoke message (step 12) by sends a SMDPP return result to the SMS-GW. Upon receiving the MAP SMDPP return result message the SMS-GW stops timer SMT.

18)If a Reply Option subparameter received in an SMS Deliver Message (step 14) indicates that User Acknowledgment is requested, the mobile station should indicate the request to the user. When the user acknowledges the message, the mobile station sends an SMS User Acknowledgement Message in response to the SMS Deliver Message.

19)If a Layer 2 Ack was solicited in the Data Burst Message (Step 18), the BS acknowledges the receipt of the message by a Layer 2 Ack.

20)The BS sends the MSC an ADDS Transfer message. The ADDS Transfer message contains the SMS User Acknowledgment Message in its ADDS User Part information element.

21)The MSC sends the SMS-GW a MAP SMDPP Invoke message and starts timer SMT. The MAP SMDPP Invoke message contains the SMS User Acknowledgment Message in the SMS_BearData Parameter.

22)The SMS-GW acknowledges the MAP SMDPP invoke message (step 21) by sending an SMDPP return result to the MSC. Upon receiving the MAP SMDPP return result message the MSC stops timer SMT.

23)SMS-GW translates the received SMS User Acknowledgment Message to an appropriate Instant Message, and forwards it to the terminating S-CSCF.

24-27) The terminating S-CSCF sends that Instant Message containing the delivery status of the message towards the IM capable UE.

28-32) The IM capable UE sends OK response the SMS-GW.

6.6   IM user receives Short Message from an SMS user

An IMS registered user with SIMPLE IM service receives a Short Message formatted via service-level interworking to an Instant Message.
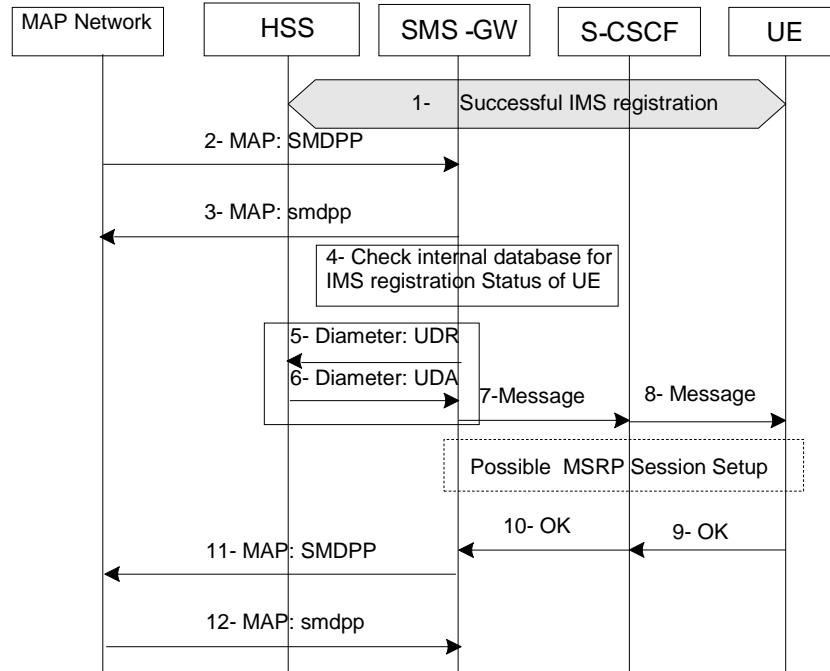
Figure 6.6: Successful IM termination after service-level interworking

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

2) SMS-GW for the UE receives a MAP SMDPP from the originating SMS-GW which is not shown in the figure.

3) SMS-GW responds to originating SMS-GW by sending MAP smdpp.

4) Option 1: If the SMS-GW receives IMS 3rd party registrations or Registration Event notifications from the S-CSCF, then it checks its internal data base and determines that the UE is IMS registered.

5) Option 2: If the SMS-GW does not receive IMS 3rd party registrations or Registration Event notifications from the S-CSCF, then it sends a Diameter User-Data-Request (UDR) message to the HSS to determine whether or not the UE is IMS registered. The SMS-GW queries the HSS using the MDN of the UE received in step 1.

6) Option 2: The HSS responds by sending a Diameter User-Data-Answer (UDA) message to the SMS-GW indicating that the UE is IMS registered. If the UE is IMS registered, the HSS also returns the UE's S-CSCF address.

7-8) If the size of the concatentated Short Message will allow for the SIP MESSAGE to not exceed the maximum allowed size as defined in [RFC3428], the SMS-GW sends a SIP MESSAGE towards the UE. Otherwise, the SMS-GW establishes MSRP session [RFC4975] towards the UE to deliver the message. The UE's P-CSCF is not shown for brevity.

9-10)The UE responds by acknowledging to the SMS-GW. If an MSRP session was established to deliver the message, the SMS-GW closes the session after the message delivery is complete.

11) If required by the SMS message deliveried in Step 2, the SMS-GW generates a MAP SMDPP message (e.g., to carry a Delivery report) to the originating SMS-GW.

12) The originating SMS-GW responds by sending a MAP smdpp message back to SMS-GW.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

7   Roles

7.1   UE

7.1.1   SMS Procedures While Attached to a 1x CS Network

The UE shall follow the MS procedures as described in [C.S0015].

7.1.2   SMS-over-IMS Procedures

The UE shall follow the UE procedures as described in [X.S0048].

7.1.3   Instant Message Procedures

The UE shall follow the UE procedures as described in [OMASIMPLE].

7.2   Short Message Service-Gateway (SMS-GW)

7.2.1   General

An SMS-GW is an entity that provides the service level interworking. The SMS-GW shall:

-   interwork a (concatenated) SMS to an Instant Message in the terminating network;

-   interwork concatenated SMS to a Large Instant Message in the terminating network;

-   interwork an Instant Message as a (concatenated) SMS in the terminating network;

-   interwork an Instant Message to a (concatenated) SMS in the originating network; and

-   support the procedures specified in subclause 5.7 of [TS 24.229].

7.2.2   Notification about registration status and UE capabilities

The SMS-GW shall follow the "Processing of third-party registration/deregistration" procedure as described in [X.S0048].

7.2.3   Handling of routing information

The SMS-GW shall be capable of determining the MS's location in the 1x network by sending an SMSRequest [XS0004-540E] to the HLR to request an MS's current SMS routing address.

The SMS-GW shall be capable of determining the UE's location in the IMS by sending a User-Data-Request [TS 29.329] to the HSS to request the UE's registration status and the S-CSCF serving the UE.

7.2.4   Interworking an Instant Message to a (concatenated) SMS in the originating network

7.2.4.1   General

This section describes the SMS-GW procedure when located in the originating network to interwork an Instant Message to an SMS.

7.2.4.2   Receiving an Instant Message in a SIP MESSAGE Request

If the SMS-GW upon receipt of a SIP MESSAGE request including an Instant Message, cannot find any SIP address for the recepient the SMS-GW shall attempt service level interworking if the message originator is authorized for service level interworking.

If the SMS-GW decides to interwork Instant Message to SMS, then the SMS-GW shall:

1) respond with a SIP 202(Accepted) response;

2) store the values of the Request-URI, the P-Asserted-Identity header field and the MESSAGE-ID header field contained in the CPIM body as defined in [OMASIMPLE], if the received SIP MESSAGE request includes a CPIM body and a Disposition-Notification header field with value "positive-delivery" or "negative-delivery" (i.e. the SIP MESSAGE sender requests the Instant Message Delivery Notification as defined in [RFC5438]); and

3) proceed as described in section 7.2.4.3.

7.2.4.3   Sending an SMS

Based upon the information in the SIP MESSAGE the SMS-GW shall construct an SMSDeliveryPointToPoint INVOKE (SMDPP) [X.S0004-540E].

The SMS-GW shall send the SMSDeliveryPointToPoint INVOKE (SMDPP).

-   if the SIP MESSAGE request contains the privacy header field with "header" or "user" or "id" and the operator policy allows sending of anonymous SMS, the SMS shall be sent anonymously by setting the originating address of the point-to-point SMS to all zeros. If the SIP MESSAGE request does not contain the privacy header field, the originating address of the SMS point-to-point message [C.S0015] shall be set based on the value of the P-Asserted-Identity or the address retrieved as part of the subscriber data from the HSS by the SMS-GW;

-   if the SIP MESSAGE contains in a CPIM body a Disposition-Notification header field with the value of "positive-delivery" or "negative-delivery" (i.e. the SIP MESSAGE sender requests the Instant Message Delivery Notification), the SMS-GW shall set the DAK_REQ to "1" in Reply Option subparameter of the SMS delivery message; and

-   if the SIP MESSAGE contains a text type that is not supported by SMS and the content in the SIP MESSAGE is entirely interworkable, the SMS-GW shall reformat the received Instant Message text to MSG_ENCODING defined in [C.S0015]. Otherwise, the SMS-GW shall follow the procedures defined in Section 7.2.4.7 and Section 7.2.4.8.

If the content of the body of Instant Message is greater than an SMS allowed message length, then the SMS-GW shall use WEMT Teleservice to carry the translated message, see [C.S0015].

7.2.4.4 Receiving an SMDPP Return Result

Upon receipt of an SMSDeliveryPointToPoint (SMDPP) Return Result the SMS-GW shall determine if an SMS_CauseCode parameter [XS0004-550-E] is included. If the SMDPP message contains an SMS_CauseCode parameter (e.g., indictaing an error condition) and if the associated SIP MESSAGE request received contained in a CPIM body a Disposition-Notification header field with value "negative-delivery", then the SMS-GW shall send the Instant Message Delivery Notification [RFC5438], as specified in Section 7.2.4.6, with the <status> element in the <delivery-notification> element set to "failed", to the associated SIP MESSAGE sender.

7.2.4.5 Receiving an SMS Delivery Acknowledgment Message

Upon receipt of an SMSDeliveryPointToPoint INVOKE (SMDPP) containing an SMS_Delivery Report in the SMS_BearerData parameter, the SMS-GW shall determine if the SMS Delivery Report Message matches a received SIP MESSAGE request. If the SMS-GW matches a received SIP MESSAGE Request the SMS-GW shall send an Instant Message Delivery Notification or discard the SMS Delivery Acknowledgment Message as described in Table 7.2.4.5.1:

Table 7.2.4.5.1: Process of the received SMS Delivery Acknowledgment Message

SMS Delivery Acknowledgement Message	The parameter of the Disposition-Notification header field in the CPIM body of the associated SIP MESSAGE	Process of the SMS-GW
Successful delivery	Include "positive-delivery"	Shall send an Instant Message Delivery Notification to the associated SIP MESSAGE sender as specified in Section 7.2.4.6 with the <status> element in the <delivery-notification> element set to "delivered".
Unsuccessful delivery	Include "negative-delivery"	Shall send an Instant Message Delivery Notification to the associated SIP MESSAGE sender as specified in 7.2.4.6 with the <status> element in the <delivery- notification> element set to "failed".
Successful delivery	Not include "positive-delivery"	May discard the SMS Delivery Acknowledgement Message.
Unsuccessful delivery	Not include "negative-delivery"	May discard the SMS Delivery Acknowledgement Message.

7.2.4.6 Sending an IMDN

If an Instant Message Delivery Notification has been requested, the SMS-GW shall:

1- construct a SIP MESSAGE request by; and

   a) the Request-URI shall contain a public user identity of the stored sender identity of the associated SIP MESSAGE;

   b) the P-Asserted-Identity header field shall be set to the value of the stored Request-URI of the associated SIP MESSAGE request;

c) the Accept-Contact header field shall be set with the g.oma.sip-im IM feature tag;

d) the User-Agent header field which shall be set with the IM release version as specified in [OMASIMPLE];

e) the Content-Type header field shall contain "message/imdn+xml"; and

f) the body of the request shall contain a CPIM message as defined in [OMASIMPLE], including the following information:

- the <message-id> XML element of the IMDN payload shall be set to the value of the stored Message-ID header field in the CPIM body of the associated SIP MESSAGE request; and

- the <status> element in the <delivery-notification> XML element of the IMDN payload shall be set to the appropriate value according to Table 7.2.4.5.1.

2- send the SIP MESSAGE request towards the UE.

7.2.4.7 Error handling when interworking from Instant Message to Short Message is not possible

When interworking is needed but is not possible, the SMS-GW shall send one of the following error responses to the sender of the Instant Message:

- If the error is because none of the content in the SIP MESSAGE request is interworkable to a SMS, then the SMS-GW shall send a 415 (Unsupported Media Type) response and shall also include an Accept header field listing the types of text media supported by SMS. For service level interworking of Instant Message to SMS, only text shall be supported.

- Otherwise a 488 (Not Acceptable Here) response shall be returned.

7.2.4.8 Partial interworking from Instant Message to SMS

If an Instant Message contains media other than text content, the SMS-GW may remove the unsupported content.

Based on operator policy the SMS-GW may insert a text warning to the receiver that non-text content has been removed from the message.

7.2.5 Inteworking an Instant Message to a (concatenated) Short Message in the terminating network

7.2.5.1 General

This section describes the procedure when the SMS-GW located in the terminating network interworks an IM to SMS.

7.2.5.2 Receiving an Instant Message in a SIP MESSAGE Request

Upon receipt of a SIP MESSAGE request including an IM in the terminating side, the SMS-GW shall check the recipient user's preferences, the current UE capability and operator policy to determine whether the interworking an IM to an SMS is capable or allowed.

If it is not possible to interwork the IM to an SMS, the SMS-GW shall respond with a SIP 606 (Not Acceptable) response.

If the operator policy allows and if the recepient is capable of accepting an SMS, then the SMS-GW shall:

1) if the CPIM body of the received SIP MESSAGE request includes a Disposition-Notification header field with value "positive-delivery" or "negative-delivery" (i.e. the IM sender requests the Instant Message Delivery Notification) then store the values of the MESSAGE-ID header field contained in the CPIM body; and

2) if the content of the IM results in a body of the SMS being greater than the allowed message length of an SMS, then the SMS-GW shall use WEMT [C.S0015] to carry the translated SMS. The SMS-GW shall reformat the received IM text into an appropriate text type supported by SMS.

   The SMS-GW shall construct an SMS Point-to-Point message containing an SMS Deliver message [C.S0015]. The SMS Delivery message shall be constructed as follows:

a) Destination Address of the SMS Point-to-Point message set based on the value of the Request-URI;

NOTE: The Request URI can contain E.164 address or an E.164 address can be fetched based on the Request-URI.

b) Originating Address of the SMS Point-to-Point message set to the E.164 address of SMS-GW

c) Message Center Time Stamp of the SMS Delivery message set to the value of time when sending the SMS.

d) Teleservice Identifier of the SMS Point-to-Point message shall be set to either CMT-95 or WEMT.

e) if the SIP MESSAGE request contains an Expires header field with a non-zero value, the value of Validity Period of the SMS Point-to-Point message shall be set based upon the non-zero value;

f) if the SIP MESSAGE contains in a CPIM body a Disposition-Notification header field with the value of "positive-delivery" or "negative-delivery" (i.e. the SIP MESSAGE sender requests the Instant Message Delivery Notification), the value of REPORT_REQ in Reply Option of the SMS Delivery message shall be set to 1; and

g) User Data of the SMS Delivery message is set to the text content within the SIP Message body.

   If the SIP MESSAGE contains a text type that is not supported by SMS and the content in the SIP MESSAGE is entirely interworkable, the SMS-GW shall reformat the received Instant Message text to MSG_ENCODING defined in [C.S0015]. Otherwise, the SMS-GW shall follow the procedures defined in 7.2.4.7 and 7.2.4.8.

   The SMS-GW shall deliver the SMS Deliver Message as specified in [X.S0048].

7.2.5.2a   Receiving an SMDPP Return Result

   Upon receipt of SMSDeliveryPointToPoint (SMDPP) Return Result the SMS-GW shall follow the procedures described in section 7.2.4.4.

7.2.5.3   Receiving an SMS Deliver Report Message

   Upon receipt of an SMSDeliveryPointToPoint INVOKE (SMDPP) containing an SMS_Delivery Report in the SMS_BearerData parameter, the SMS-GW shall determine if the SMS Delivery Report Message matches a SIP MESSAGE request. If the SMS-GW matches a SIP MESSAGE Request the SMS-GW shall send an Instant Message Delivery Notification or discard the SMS Delivery Acknowledgment Message as described in Table 7.2.4.5.1.

7.2.5.4   Sending an IMDN

The IMDN is constructed as described in section 7.2.4.6.

7.2.5.5   Error handling when interworking from Instant Message to Short Message is not possible

The procedures are specified as in section 7.2.4.7.

7.2.5.6   Partial interworking from Instant Message to Short Message

The procedures are specified as in section 7.2.4.8.

7.2.6   Interworking a Short Message(s) to an Instant Message

7.2.6.1   General

This section describes the procedure when the SMS-GW located in the terminating network interworks SMS to an Instant Message.

7.2.6.2   Receiving an SMS Deliver Message

When the SMS-GW in the terminating networks receives an SMS, it shalldetermine if service level interworking is needed for the served user by checking if the served user is subscribed for service level interworking and then user preference or operator policy indicating the priority to receive an SMS as an Instant Message.

If the received SMS is the first segment of the concatenated SMS and the SMS-GW is to use service level interworking, the SMS-GW shall store and acknowledge all segments except the last segment of the concatenated SMS. When the SMS-GW receives the last segment of the concatenated SMS and the full length of the received concatenated SMS in IM format is less than the allowed message length of an IM, the SMS-GW shall create an Instant Message that includes the concatenated SMS in accordance with section 7.2.6.3.1.

If the message length of the user generated SMS in IM format is greater than the allowed message length of an IM as defined in [RFC3428], the procedure shall be in accordance with subclause 7.2.6.3.2.

7.2.6.3   Sending an Instant Message

7.2.6.3.1   Sending an Instant Message in a SIP MESSAGE Request

After receiving either a single SMS or a full set of concatenated SMS not exceeding the size limit of a SIP MESSAGE that is to be delivered as an IM, the SMS-GW shall send a SIP MESSAGE request applying the related procedures for an AS acting as an originating UA as defined in subclause 5.7.3 in [TS 24.229]. In addition, the SMS-GW shall include in the SIP MESSAGE request:

a) the Request URI set to a Tel URI or a SIP URI corresponding to the MDN of the recipient;

b) the P-Asserted Identity header field set to a Tel URI based on origination address;

c) the appropriate MIME type(s) in the Content-Type header field;

d) an Accept-Contact header field with the IM feature-tag g.oma.sip-im;

e) a User-Agent header field to indicate the IM release version as specified in [OMASIMPLE];

f) a Request-Disposition header field with the value "no-queue", as specified in [RFC3841], in order to ensure the SIP MESSAGE is not queued for delivery if the recipient is temporarily unreachable; and

g) the contents of the Body set to the appropriate MIME type based on received content in SMS.

The SMS-GW shall send the SIP MESSAGE request to the S-CSCF.

7.2.6.3.2   Sending a Large Instant Message

After receiving a full set of concatenated SMS exceeding the size limit of a SIP MESSAGE based Instant Message, the SMS-GW shall send a SIP INVITE request applying the related procedures for an AS acting as an originating UA as defined in subclause 5.7.3 in [TS 24.229]. In addition, The SMS-GW shall include in the SIP INVITE request:

a) an Accept-Contact header field with the IM feature-tags g.oma.sip-im and g.oma.sip-im.large-message;

b) a User-Agent header field to indicate the IM release version as specified in [OMASIMPLE];

c) in the Contact header field, the IM feature-tag "+g.oma.sip-im";

d) the Request-URI set to the public user identity deduced from the information in destination address;

e) the P-Asserted Identity header field set to a Tel URI based on origination address;

f) a Request-Disposition header field with the value "no-queue", as specified in [RFC3841], in order to ensure the SIP INVITE request is not queued for delivery if the recipient is temporarily unreachable; and

g) in the SDP, the direction attribute set to a=sendonly.

The SMS-GW shall then send the SIP INVITE request to the S-CSCF.

Upon receipt of a SIP 2xx reponse to the SIP INVITE request, the SMS-GW shall send MSRP SEND request(s) containing the content of the concatenated SMS as described in [OMASIMPLE]. Upon receipt of a SIP non-2xx response see section 7.2.6.4.2.

Upon receipt of corresponding response for the last chunk of MSRP SEND request, e.g. SIP 200 (OK) response, the SMS-GW shall generated a SIP BYE request to release the session as in [TS 24.229].

7.2.6.4   Sending an SMS Deliver Acknowledgement Message

7.2.6.4.1   Sending an SMS Deliver Acknowledgement Message after sending an Instant Message in SIP MESSAGE Request

If a delivery acknowledgement message was requested and if the received SIP response is a 2xx SIP response, the SMS-GW shall create a delivery report [C.S0015].

If a delivery acknowlegement message was requested and if the received SIP response is not a 2xx response, the SMS-GW shall create a delivery report based upon the SIP response to the Instant Message. The TP-FCS value in the delivery report shall be set in accordance with the table 7.2.6.4.1-1.

Table 7.2.6.4.1-1: Mapping from Status Code to TP-FCS element

SIP response Status Code	Value of the TP-FCS element
3XX	FF Unspecified error cause
5XX	FF Unspecified error cause
400 Bad Request	FF Unspecified error cause
401 Unauthorized	FF Unspecified error cause
402 Payment Required	FF Unspecified error cause
403 Forbidden	FF Unspecified error cause
404 Not Found	FF Unspecified error cause
405 Method Not Allowed	FF Unspecified error cause
406 Not Acceptable	FF Unspecified error cause
407 Proxy authentication required	FF Unspecified error cause
408 Request Timeout	FF Unspecified error cause
410 Gone	FF Unspecified error cause
413 Request Entity too long	FF Unspecified error cause
414 Request-URI too long	FF Unspecified error cause
415 Unsupported Media type	FF Unspecified error cause
416 Unsupported URI scheme	FF Unspecified error cause
420 Bad Extension	FF Unspecified error cause
421 Extension required	FF Unspecified error cause
423 Interval Too Brief	FF Unspecified error cause
433 Anonymity Disallowed.(NOTE 1)	FF Unspecified error cause
480 Temporarily Unavailable	FF Unspecified error cause
481 Call/Transaction does not exist	FF Unspecified error cause
482 Loop detected	FF Unspecified error cause
483 Too many hops	FF Unspecified error cause
484 Address Incomplete	FF Unspecified error cause
485 Ambiguous	FF Unspecified error cause
486 Busy Here	D2 Error in MS
487 Request terminated	FF Unspecified error cause
488 Not acceptable here	FF Unspecified error cause
493 Undecipherable	FF Unspecified error cause
600 Busy Everywhere	D2 Error in MS
603 Decline	D2 Error in MS
604 Does not exist anywhere	FF Unspecified error cause
606 Not acceptable	FF Unspecified error cause

The SMS-GW sends an SMDPP_INVOKE containing the delivery acknowledgement report.

7.2.6.4.2 Sending an SMS Deliver Acknowledgement Message after concatenated SMS delivered in a Large Instant Message

Upon receipt of a non-2xx SIP response for the the SIP INVITE request sent as described in subclause 7.2.6.3.2, the SMS-GW shall send an SMDPP INVOKE. The SMDPP INVOKE shall include an SMS_Delivery Report in the SMS_BearerData parameter. The SMS_Delivery Report TP-Failure Cause Subparameter is set according to Table 7.2.6.4.1-1.

Upon receipt of a non-200 response for the MSRP SEND request sent as described in subclause 7.2.6.3.2, the SMS-GW shall send an SMDPP INVOKE. The SMDPP INVOKE shall include an SMS_Delivery Report in the SMS_BearerData parameter. The SMS_Delivery Report TP-Failure Cause Subparameter is set according to Table 7.2.6.4.1-1.

Upon receipt of a 2xx SIP response for the SIP BYE request sent as described in subclause 7.2.6.3.2, the SMS-GW shall send an SMDPP INVOKE. The SMDPP INVOKE shall include an SMS_Delivery Report in the SMS_BearerData parameter.

Upon receipt of a non-2xx SIP response for the the SIP BYE request sent as described in subclause 7.2.6.3.2, the SMS-GW shall send an SMDPP INVOKE. The SMDPP INVOKE shall include an SMS_Delivery Report in the SMS_BearerData parameter. The SMS_Delivery Report TP-Failure Cause Subparameter is set according to Table 7.2.6.4.1-1.