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IP-Short-Message-Gateway (IP-SM-GW) enhancements for interworking with Open Mobile Alliance (OMA) Converged IP Messaging (CPM)
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Contents

Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

NOTE: This clause will not be transferred to TS 23.204.

This Technical Report is used to gather agreed changes for the stage 2 aspects of the WID "IP-SM-GW enhancements for CPM-SMS Interworking". When the Technical Report is approved, the agreed changes are transferred in block to TS 23.204, excluding this introduction, Annex Y, and Annex Z "Change history".

The Technical Report copies the structure of TS 23.204, if an agreed change adds a new clause to the Technical Report, and thus to TS 23.204, a note indicates that at the beginning of the clause.

If the Technical Report does not propose any change for a specific clause of TS 23.204, then the content of that clause is not copied from TS 23.204 to the Technical Report, only a note is added indicating that no change identified for that clause. If the Technical Report proposes a change for a specific clause of TS 23.204, then Underlined-Red text identifies the new text compared to TS 23.204, Strikethrough Red text (if any) identifies text to be deleted from TS 23.204.

1 Scope

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

1 Enhancements to the HSS;

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

3 Authentication of service usage and registration;

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

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

The document also specifies the capabilities and enhancements needed to support the service level interworking for the Short Message service as defined in the TS 23.040 [2] and in this specification and the Instant Messaging service as defined in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12]. The features supported from the IM 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[14] is considered as a subset of OMA-TS-SIMPLE-IM-V1_0-20070816-C [12].

The service requirements are described in TS 22.340 [18].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

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

[3] Void.

[4] Void.

[5] Void.

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

[7] Void.

[8] Void.

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

[10] Void.

[11] Void.

[12] 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.

[13] IETF RFC 5438draft, draft-ietf-simple-imdn-04: "Instant Message Disposition Notification", February, 2009.

[14] 3GPP TS 24.247: "Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".

[15] OMA: "CPM Requirements", OMA-RD-CPM-V1_0-20091218-D, http://member.openmobilealliance.org/ftp/Public_documents/MWG/MWG-CPM/Permanent_documents/OMA-RD-CPM-V1_0-20091218-D.zip

[16] OMA: "CPM Architecture", OMA-AD-CPM-V1_0-20091222-D, http://member.openmobilealliance.org/ftp/Public_documents/MWG/MWG-CPM/Permanent_documents/OMA-AD-CPM-V1_0-20091222-D.zip

[17] OMA: "CPM Conversation Functions", OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D, http://member.openmobilealliance.org/ftp/Public_documents/MWG/MWG-CPM/Permanent_documents/OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D.zip

[18] 3GPP TS 22.340: "IP Multimedia System (IMS) messaging; Stage 1".

[19] IETF RFC 4975: "The Message Session Relay Protocol (MSRP)", September 2007.

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 definitions apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1]:

Converged IP Messaging: as defined in OMA-RD-CPM-V1_0-20091218-D [15]. Converged IP Messaging supports one-to-one, one-to-many personal communications, and also communication with Applications.

CPM Message: as defined in OMA-RD-CPM-V1_0-20091218-D [15]: Information that is sent to one or more recipients. A CPM Message can contain several discrete Media (e.g. text, images, audio-clips, video-clips).

CPM AS: An application server supporting the functionality of a CPM Participating Function and/or a CPM Controlling Function as defined in OMA-RD-CPM-V1_0-20091218-D [15].

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 OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] and TS 24.247 [14]. The term Instant Message is also used to designate a CPM Message.

Interworking Selection Function: as defined in OMA-AD-CPM-V1_0-20091222-D [16]. The Interworking Selection Function selects an Interworking Function that should perform the actual interworking between CPM and SMS.

SIMPLE IM service: the Instant Messaging Service as defined in the OMA-TS-SIMPLE_IM-V1_0-20070816-C [12].

SM origination: origination of a Short Message (including SMS over IP) by an SMS capable UE, as defined in TS 23.040 [2] and this specification.

SM termination: termination of a Short Message (including SMS over IP) by an SMS capable UE, as defined in TS 23.040 [2] and this specification.

SMS: the Short Message Service as defined in the TS 23.040 [2].

SMSIP MESSAGE: an immediate message as defined in TS 23.228 [9], which encapsulates a SM in its text body.

SMSIP UE: a UE which supports SMSIP MESSAGE.

3.2 Abbreviations

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

CPM	Converged IP Messaging
IM	Instant Message
IMDN	Instant Message Disposition Notification
IP-SM-GW	IP-Short-Message-Gateway
ISF	Interworking Selection Function
SM	Short Message

4 Void

NOTE: No change identified for this clause.

4a Architecture Requirements

4a.1 General

The SMS-IP architecture supports the following:

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

- Functionality is required to be able to select the domain for message delivery between IMS and CS/PS, and to have the message delivered to the selected domain.

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

- The interworking function shall generate the appropriate charging-related information and provide the appropriate online charging mechanism (if it is applied for the Short Message Service and/or SIMPLE IM services and/or CPM based services) for the interworking services.

4a.2 Transport-level interworking

NOTE: No change identified for this clause.

4a.3 Service-level interworking

For service-level interworking, the architecture allows for the following:

- The service-level interworking is a value added service which requires service subscription. In addition, it shall also take the operator's policy, if available, into account, e.g. checking on the barring setting of the subscriber to determine whether to provide this interworking or not, so the service authorisation 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 OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] and Short Message Service, as defined in the TS 23.040 [2] and in the current specification.

- The service-level interworking shall support interworking between OMA CPM service as defined in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17] and Short Message Service, as defined in the TS 23.040 [2] and in the current specification.

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

- The service level interworking shall be transparent to the end user.

- 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 TS 23.040 [2] or of the SIMPLE IM service enabler as described in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or of the CPM service enabler as described in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17]. Existing security mechanisms for both the SIMPLE IM service, the Converged IP Messaging 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, CS or PS.

- If an SMS user requests an SMS status report that the message was delivered to the recipient, then an SMS status 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 and the Instant Message is interworked to Short Message on the originating side, an SMS status report shall be interworked to a delivery notification when the message is delivered.

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

  - Originating network:

    - The sender is an IM user or a CPM user who 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 or a CPM user and has subscribed to the interworking service.

NOTE: For ensuring the integrity of the response messages from the IM UE or the CPM UE, it is strongly recommended that in networks where the IP-SM-GW is deployed, no intermediate nodes modify or terminate the message between the IP-SM-GW and the terminating IM UE or CPM UE. If intermediate nodes are deployed, they can send response messages that do not reflect the final response from the IM UE or CPM UE. Final responses from the IM UE or CPM 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 SMS over a generic IP CAN.
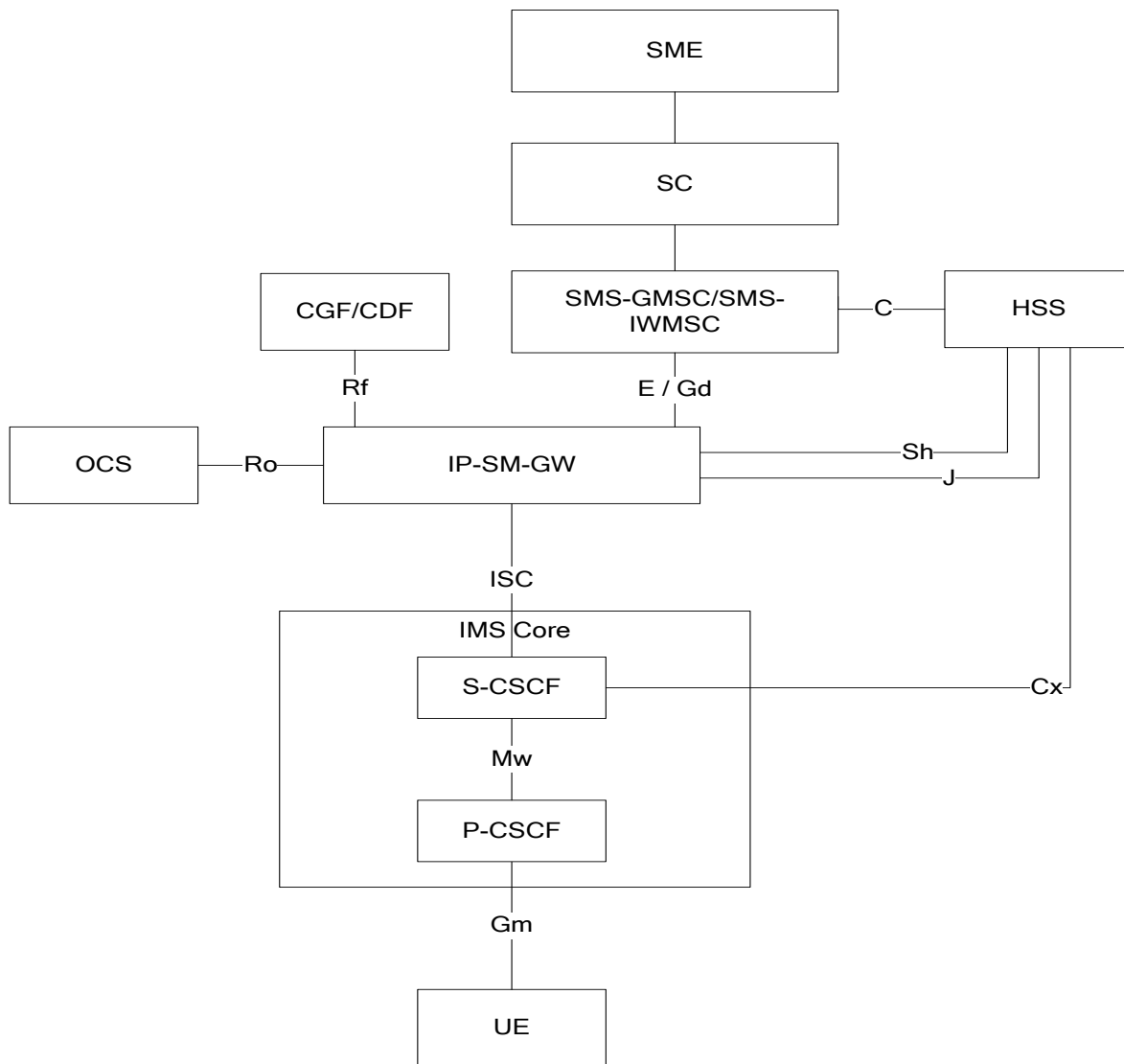
Figure 5.1: Architecture for providing SMS over a generic IP-CAN

NOTE: Nodes specific to the CPM functions such as ISF are either collocated with the IP-SM-GW or else are not shown.

5.2 Reference points

5.2.1 General

NOTE: No change identified for this clause.

5.2.2 C interface

NOTE: No change identified for this clause.

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

NOTE: No change identified for this clause.

5.2.4 E/Gd interface

NOTE: No change identified for this clause.

5.2.5 ISC interface

NOTE: No change identified for this clause.

5.2.6 Void

NOTE: No change identified for this clause.

5.3 Functional entities

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

5.3.1.1 General

NOTE: No change identified for this clause.

5.3.1.2 Transport-level interworking

NOTE: No change identified for this clause.

5.3.1.3 Service-level interworking

The additional functions of the IP-SM-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 use the SC address retrieved either as part of the subscriber data from the HSS at registration or as provisioned by configuration, when transforming the Instant Message into Short Message.

- to perform the authorization for service-level interworking.

The additional functions of the IP-SM-GW when service-level interworking is done between Short Messages and CPM Messages in IMS are the same as functions performed for Instant Messages in IMS and additionally:

- to translate a chat session invitation to a short message including instructions for the SMS user how to react (accept/reject) the chat session invitation, if operator policy mandates the consent of the SMS user. Otherwise the IP-SM-GW shall respond a chat session invitation on behalf of the SMS user (accept/reject), according to operator policy;

- to translate the SMS user's answer to a chat session invitation to a proper response for the chat session invitation request;

- to inform SMS user about the changes of group chat session parameters;

- to translate a chat session teardown request to a short message, if operator policy mandates it; and

- to translate the SMS user's request to leave a chat session to a proper CPM request.

5.3.2 HSS

NOTE: No change identified for this clause.

6 Procedures

6.0 General

The clause describes the procedures for the support of transport-level interworking between Short Message service and encapsulated Short Message via IP service, for the support of the service-level interworking for the Short Message service and Instant Messaging service as defined in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] and for the support of the service-level interworking for the Short Message service and Converged IP Messaging service as defined in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17]. Clauses only applying to either transport-level interworking or service-level interworking are indicated as such.

NOTE: In the procedures in the following clauses, the I-CSCF, P-CSCF and ASs such as IM AS, as well as nodes specific to CPM functions such as ISF, are not shown in the figures.

6.1 Registration procedure

NOTE: No change identified for this clause.

6.2 De-registration procedure

6.2.1 UE initiated

NOTE: No change identified for this clause.

6.2.2 Network initiated

NOTE: No change identified for this clause.

6.3 Transport-level interworking: Successful encapsulated Short Message origination procedure

NOTE: No change identified for this clause.

6.4 Transport-level interworking: Successful encapsulated Short Message termination procedure

NOTE: No change identified for this clause.

6.5 Transport-level interworking: Delivery Report procedure

NOTE: No change identified for this clause.

6.5a Unsuccessful SM termination procedure

NOTE: No change identified for this clause.

6.5b Alert Service Centre procedure when UE is available

When a Short Message is received in the IP-SM-GW for delivery to an IMS subscriber, the IP-SM-GW shall verify the registration status of the UE. If the UE is not registered in IMS, or is registered in IMS but does not advertise the Converged IP Messaging, SIMPLE IM or SMSIP capability, the Short Message shall not be interworked; neither at service level nor at transport level. Based on operator policy and user preferences, either the message is sent over CS/PS or an error indication is sent back to the SMS-SC. In the latter case, when the UE registers in IMS advertising the Converged IP Messaging, SIMPLE IM and/or the SMSIP capability at a later time, this information is sent to the SMS-SC and the delivery is attempted at that time, as an Instant Message or an encapsulated Short Message as appropriate.

NOTE: The service level or transport level interworking of a message is prohibited as identified in the above scenario in order to prevent the possibility of the message being deferred in the terminating network.

6.6 Transport-level interworking: Alert service centre procedure when memory capacity is available

NOTE: No change identified for this clause.

6.7 Service-level Interworking: IM or CPM capable UE sends an Instant Message to an SMS user
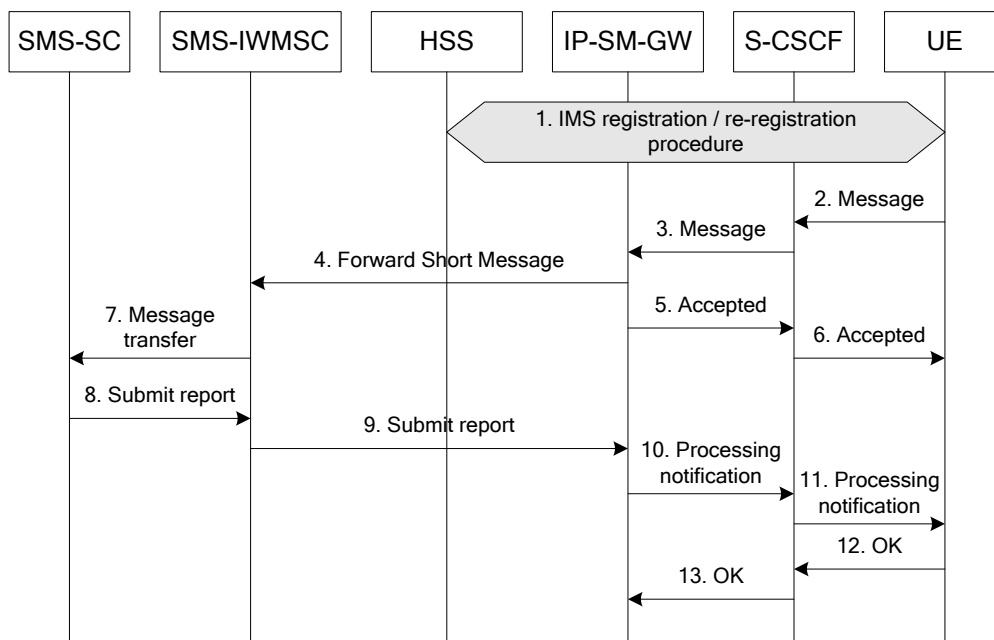
Figure 6.7: Successful IM origination to SMS procedure

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 OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

3) S-CSCF forwards the Instant Message to IP-SM-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 IP-SM-GW shall decide whether to perform service-level interworking depending on SIP request header (e.g. Request-URI), operator policy, when the Instant Message is not routable in the IMS. If an ISF is deployed in the network, the ISF may take the decision to interwork using SMS and sends the message to the IP-SM-GW

to perform the interworking. If IP-SM-GW decided to perform service-level interworking, the IP-SM-GW performs service authorization based on the stored subscriber data retrieved from the HLR/HSS at the time of the registration procedure as specified in clause 6.1. The IP-SM-GW shall check whether the originating subscriber is authorised to use the interworking service. If the result of service authorization is negative, the IP-SM-GW shall not forward the message, and shall return the appropriate error information to the UE in a failure report. Otherwise, the IP-SM-GW shall use the SC Address in the subscriber data retrieved from the HSS at registration or provisioned by configuration and translates the Instant Message to a Short Message (SMS- SUBMIT) carrying SC Address, then forwards it towards SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). If the size of the content of the Instant Message is larger than the size of the content that one Short Message could transfer, the IP-SM-GW shall split the content of the Instant Message into several parts, translate them to concatenated Short Messages, and forward the concatenated Short Messages to the SMS-SC as described in TS 23.040 [2]. If the sender of the Instant Message requests to hide its Public User Identity from the recipient and operator policy allows for this, the IP-SM-GW shall anonymize the identity of the user to the recipient. Otherwise, if operator policy prohibits this, the IP SM GW shall return an appropriate error to the user.

5) If service authorization is successful, the IP-SM-GW acknowledges the Instant Message.

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

NOTE 2: Steps 5 and 6 can occur anytime after the subscriber authorization check has been performed by the IP-SM-GW.

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

8) The SMS-SC sends a Submit report (SMS-SUBMIT REPORT) to the SMS-IWMSC (see TS 23.040 [2]).

9) SMS-IWMSC sends a Submit report to IP-SM-GW (see TS 23.040 [2]).

NOTE 3: The procedure can end in step 9. Steps 10 to 13 occur only if the IM user requested a processing notification in the Instant Message sent in step 2, as described in IETF IMDN RFC 5438draft-ietf-simple-imdn [13].

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

6.8 Interaction between transport-level and service-level Interworking

6.8.1 General

The interaction between transport-level interworking (between SMS over CS/PS 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 may be performed.

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

If a user is subscribed to both transport-level interworking and service-level interworking, and is authorised for both, the behaviour of the IP-SM-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 OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or the CPM AS, defined in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17];

- the IP-SM-GW.

The following clauses describe the different interaction scenarios.

6.8.2 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 IP-SM-GW based on the iFC. The subscription of the transport level interworking and the service level interworking applies for different iFC. However, the SIP MESSAGE is forwarded to the IP-SM-GW if the user subscribes to one of the interworking services. If there is no subscription for the interworking service, 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 message to the terminating IMS network. If it fails, an error is returned to the sender.

NOTE 1: if an IM AS or a CPM AS is present in the network, Instant Messages are routed to it before going to the IP-SM-GW.

NOTE 2: An encapsulated Short Message uses the PSI of the SC as the Request-URI. If the user is not subscribed to transport-level interworking and the IP-SM-GW is not invoked, the ENUM query fails, and an error is returned to the sender.

When the IP-SM-GW receives the SIP MESSAGE, it shall decide which interworking should be performed based on the content of the received SIP MESSAGE, as the IP-SM-GW can distinguish between an encapsulated Short Message and an Instant Message. If an encapsulated Short Message is received and if the subscriber is authorised for the service, the IP-SM-GW maps the encapsulated Short Message to a Short Message. Similarly, when an Instant Message is received, the IP-SM-GW considers performing the service-level interworking if the service is authorized: the IP-SM-GW shall decide whether to send the SIP MESSAGE via interworking service based on SIP request header (e.g., R-URI), operator policy, when the Instant Message is not routeable in the IMS or when the IP-SM-GW is selected to handle the message.
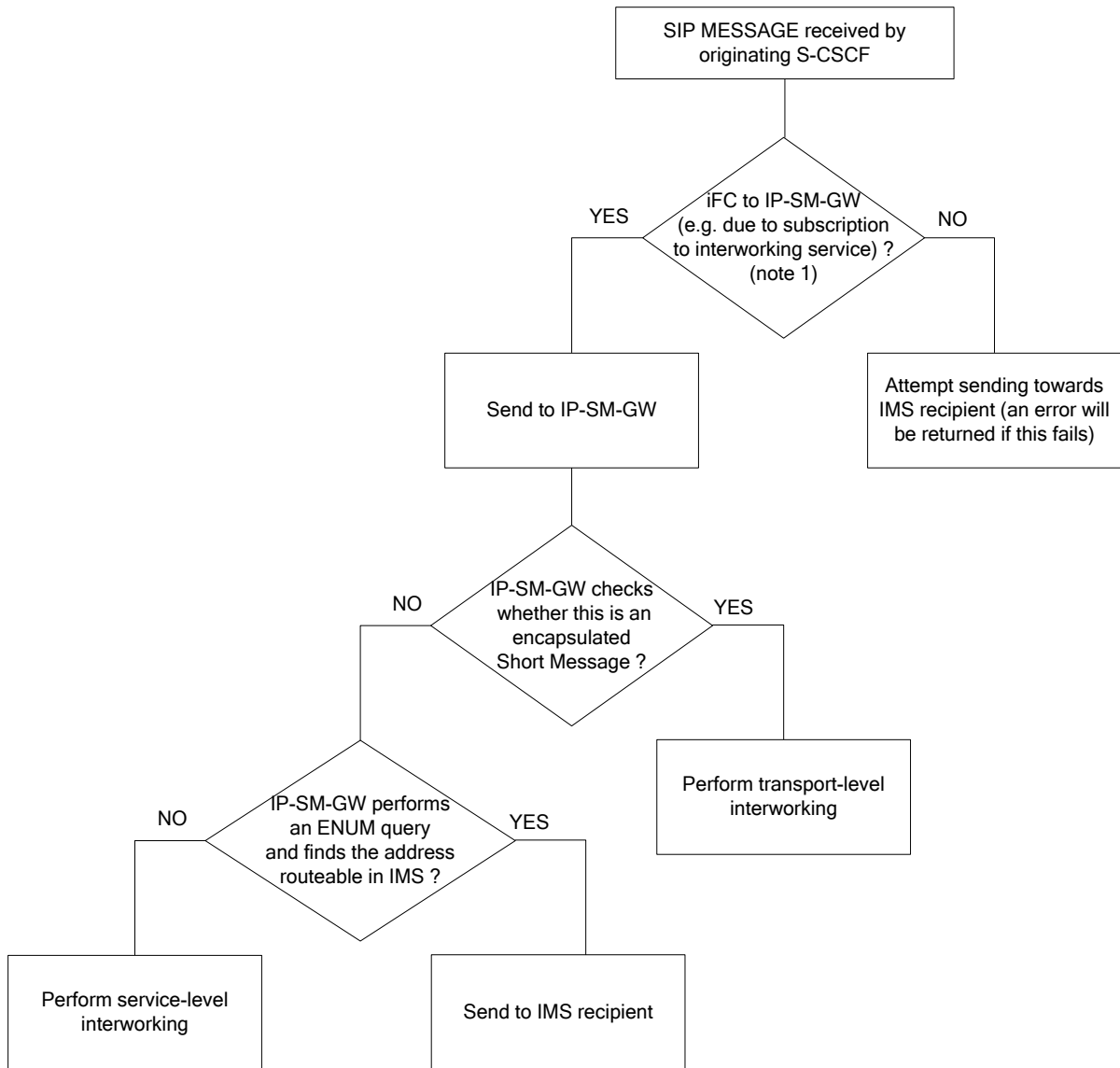
Figure 6.8.2.1: Performing interworking service on originating side

6.8.3 IMS Terminating

When the IP-SM-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 IP-SM-GW will determine whether the transport level interworking or the service level interworking is to be preformed based on the users' subscription and authorisation, and on the UE capability as indicated during IMS registration. If the user has subscribed to both services, is authorised 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 1: If the incoming Short Message is interworked to an Instant Message, the resulting Instant Message could be routed to the IM AS or CPM AS before being sent to the UE.
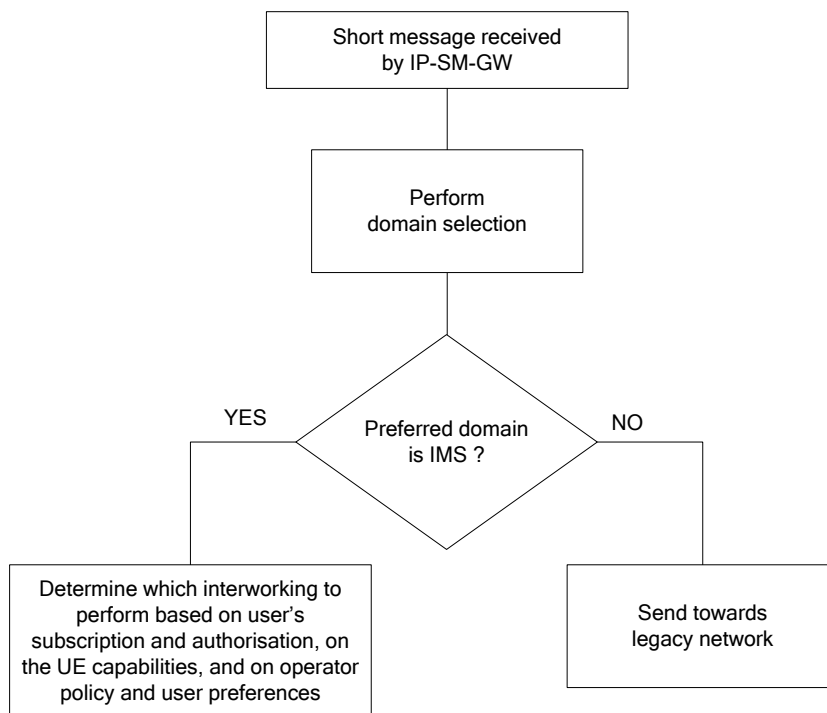
Figure 6.8.3.1: Performing interworking service on terminating side for an incoming Short Message

When the IP-SM-GW receives an Instant Message, based on user subscription and authorisation for service-level interworking, on operator policy and user preferences, and on UE capability indicated during IMS registration, the IP-SM-GW may perform service-level interworking to transform the message format to SMS and deliver the message to the UE. If the user is subscribed and authorised for transport-level interworking, and based on UE capability indicated during IMS registration, and on operator policy and user preferences, the message may be delivered as an encapsulated Short Message to the UE over IMS. Otherwise, the Short Message is delivered over CS/PS.

6.9 Service-level Interworking: Concatenated Short Messages delivered as a large Instant Message

An IMS registered user with IM service or CPM service receives a concatenated short message delivered as two or more short messages. The information below describes the behaviour when the received concatenated Short Message exceeds the maximum payload size of an Instant Message.

Editor's Note: The rest of the clause 6.9 is identical to what is in TS 23.204 clause 6.9.

6.10 Service-level interworking: Status Report procedure for Instant Message to Short Message interworking

NOTE: No change identified for this clause.

6.11 IM or CPM user sends an Instant Message to an SMSIP UE

An IMS registered user with SIMPLE IM service or CPM service sends an Instant Message via service-level interworking as an encapsulated Short Message to an SMSIP UE, which did not indicate support for SIMPLE IM or CPM when registering to IMS.

NOTE 1: Based upon user subscription and depending on network deployment, other Application Servers could be processing the incoming Instant Message before the IP-SM-GW. The behaviour of the IM AS is described in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12]. The behaviour of the CPM AS is described in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

Figure 6.11: Successful UE termination Instant Message to encapsulated Short Message procedure

Editor's Note: The figure above has been changed from the original version in TS 23.204.

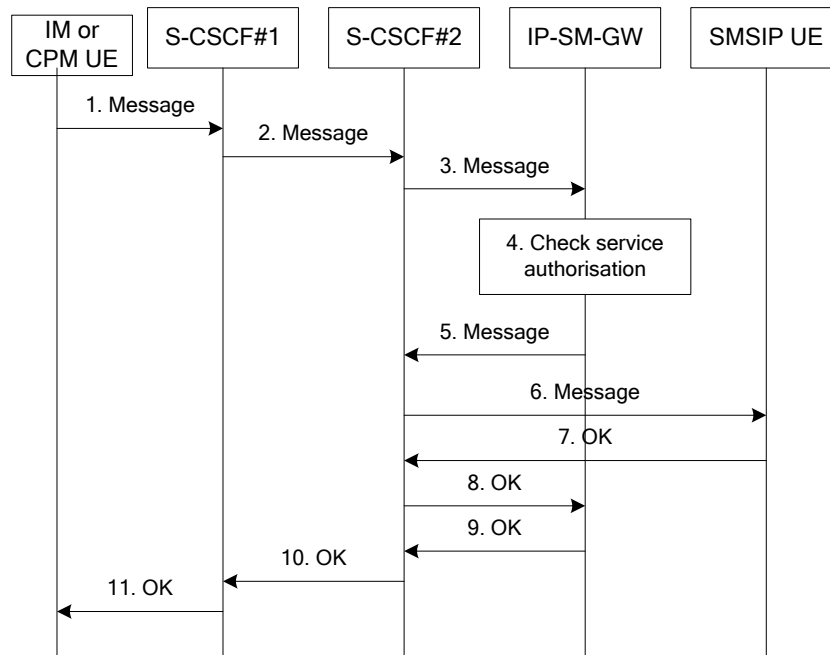1) IM or CPM UE sends an Instant Message to the S-CSCF#1. The UE may request to hide its Public User Identity from the recipient within the Instant Message, as described in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] and in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

2) The S-CSCF#1 forwards the Instant Message to the S-CSCF#2.

3) The S-CSCF#2 forwards the Instant Message to the IP-SM-GW based on iFC.

4) Based on user subscription and authorisation for service-level interworking, on operator policy and user preferences, and on UE capability indicated during IMS registration, the IP-SM-GW shall decide whether to perform service-level interworking. If the user is subscribed and authorised for transport-level interworking, and based on UE capability indicated during IMS registration, and on operator policy and user preferences, the message may be delivered as an encapsulated Short Message to the UE over IMS. Otherwise, the Short Message is delivered over CS/PS, as described in clause 6.13. If the sender of the Instant Message requests to hide its Public User Identity from the recipient and operator policy allows for this, the IP-SM-GW shall anonymise the identity of the user to the recipient. Otherwise, if operator policy prohibits this, the IP-SM-GW shall return an appropriate error to the user.

NOTE 2:   If a delivery notification was requested in the message sent by the UE in step 1 as described in IETF IMDN RFC 5438draft-ietf-simple-imdn [13], the procedure for delivery report described in clause 6.12 applies. Otherwise IP-SM-GW will just acknowledge, at the SIP level, the Delivery report received from the SMSIP UE.

5) The IP-SM-GW forwards the encapsulated Short Message to the S-CSCF#2.

6) The S-CSCF#2 forwards the encapsulated Short Message to the SMSIP UE.

7) The SMSIP UE acknowledges the translated encapsulated Short Message.

8) The S-CSCF forwards the acknowledgement of the translated encapsulated Short Message to the IP-SM-GW.

9-11)   The IP-SM-GW forwards the acknowledgement of the translated encapsulated Short Message to the originating IM UE or CPM UE.

6.12 Delivery report for an Instant Message delivered as encapsulated Short Message

This procedure follows the procedure described in clause 6.11, when the original Instant Message included a delivery notification request.
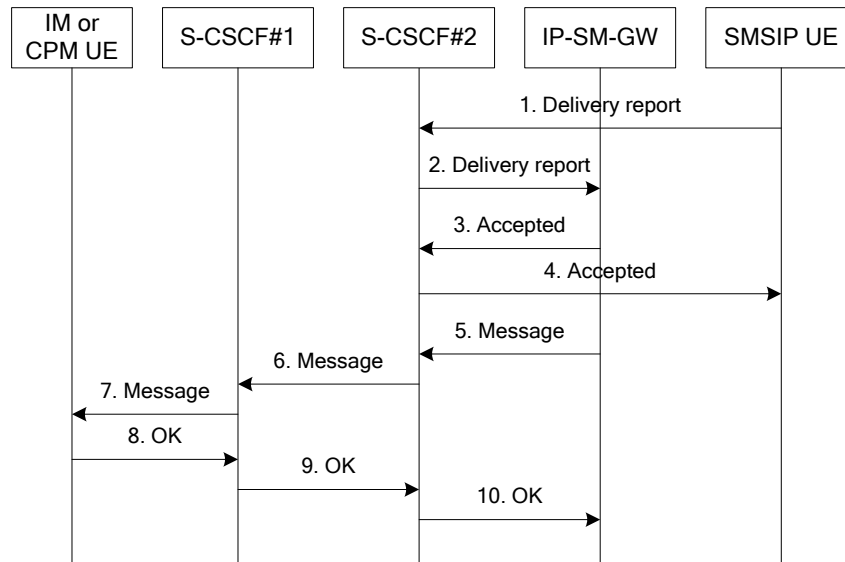
Figure 6.12: Delivery report after a successful Instant Message to encapsulated Short Message procedure

Editor's Note: The figure above has been changed from the original version in TS 23.204.

NOTE: An encapsulated Short Message has been sent successfully according to the procedure described in clause 6.11 before the procedure below can be performed.

1-2)   The SMSIP UE has received the Short Message as described in clause 6.11 and sends a Delivery report (SMS-DELIVER-REPORT) to the IP-SM-GW via the S-CSCF.

3-4)   The IP-SM-GW acknowledges, at the SIP level, the Delivery report to the SMSIP UE via the S-CSCF.

5-7)   The IP-SM-GW sends a Delivery Notification to the IM UE or CPM UE.

8-10)   The IM UE or CPM UE acknowledges the reception of the Delivery Notification.

6.13 Service-level interworking: IM or CPM 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 or an un-registered IMS subscriber. For the unregistered case, the S-CSCF forwards the Instant Message to the IP-SM-GW based on the unregistered iFC of the subscriber.
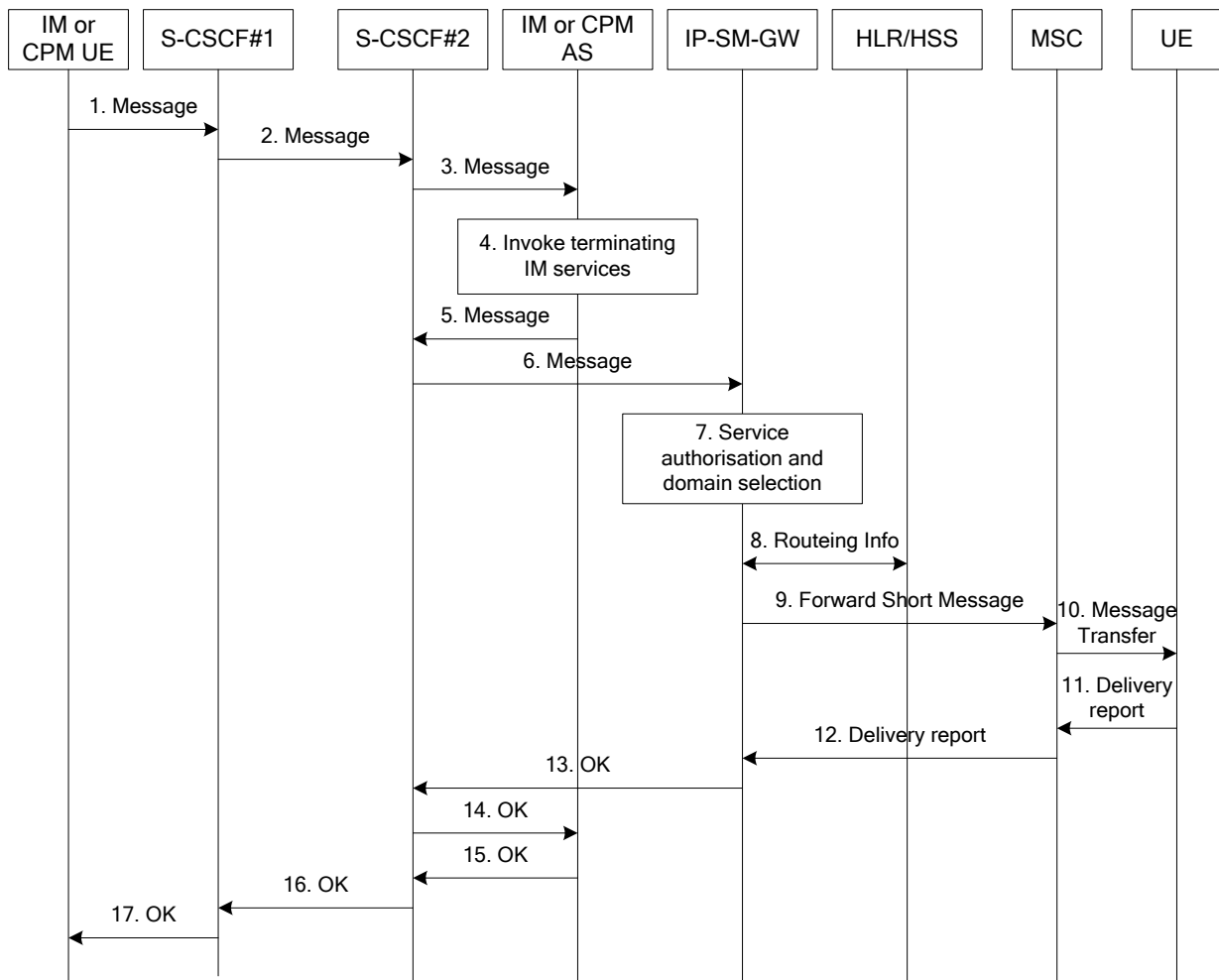
Figure 6.13: Successful IM terminating to SMS procedure with Interworking in the Terminating Side

Editor's Note: The figure above has been changed from the original version in TS 23.204.

1) UE submits an Instant Message, destined to another IM user or CPM 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 OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] and in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

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") or to the CPM AS ("Terminating CPM AS") based on stored iFC.

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

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

5) The IM AS or CPM AS can forward the Instant Message back to the terminating S-CSCF, e.g. the terminating IM user is offline or the CPM user has no terminating interworking user preferences.

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

7) If the user is authorized, the IP-SM-GW performs service-level interworking by converting the Instant Message to Short Message. The IP-SM-GW shall obtain the routeing information for the UE from the HLR/HSS and deliver the message to the UE. If the sender of the Instant Message requests to hide its Public User Identity from

the recipient and operator policy allows for this, the IP-SM-GW shall anonymise the identity of the user to the recipient. Otherwise, if operator policy prohibits this, the IP-SM-GW shall return an appropriate error to the user.

8) The IP-SM-GW obtains the routeing information for the destination UE from the HLR/HSS.

9) The IP-SM-GW sends the Forward Short Message message to the target MSC.

10) The MSC sends the Short Message to the UE.

11) The UE acknowledges the receipt of the Short Message.

12) The MSC sends a Delivery report (SMS-DELIVER-REPORT) to the IP-SM-GW.

13) The IP-SM-GW sends OK response to the terminating S-CSCF.

14) The S-CSCF forwards the OK to the terminating IM AS or CPM AS.

15) The terminating IM AS or CPM AS forwards the OK response back to the terminating S-CSCF.

16) The terminating S-CSCF forwards the OK back towards the originating S-CSCF.

17) The originating S-CSCF forwards the OK to the originating UE.

6.14 Service-level interworking: IM or CPM user receives Short Message from an SMS user

An IMS registered user with SIMPLE IM or CPM service receives a Short Message formatted via service-level interworking to an Instant Message.

Editor's Note: The rest of the clause 6.14 is identical to what is in TS 23.204 clause 6.14.

6.15 Service-level Interworking: CPM capable UE sends a Chat session invitation to an SMS user

NOTE: This is a new sub-clause to be added to TS 23.204.

6.15.1 IP-SM-GW in the originating network

Figure 6.15.1: Chat session invitation to SMS user and Message data exchange (IP-SM-GW in originating network)

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

2) The UE sends a session invitation request for a chat session to the S-CSCF, using the appropriate SIP method. The UE may request to hide its Public User Identity from the recipient within the session invitation.

3) S-CSCF forwards the session invitation to the IP-SM-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 IP-SM-GW performs service authorization based on the stored subscriber data retrieved from the HLR/HSS at the time of the registration procedure as specified in clause 6.1. The IP-SM-GW shall check whether the originating subscriber is authorised to use the interworking service. If the result of service authorization is negative, the IP-SM-GW shall not forward the message, and shall return the appropriate error information to the UE in a failure report. If the sender of the session invitation asks to hide its Public User Identity from the recipient and operator policy allows for this, the IP-SM-GW shall anonymise the identity of the user in all messages it sends to the recipient. If operator policy prohibits anonymity, the IP-SM-GW shall not perform interworking and shall send back an appropriate response.

NOTE 2:   Steps 5 to 7 are only executed if the operator policy is to check back with the SMS user before accepting the invitation on behalf of the SMS user. Otherwise, the process continues with step 8, as if the SMS user has responded with an acceptance of the chat session invitation.

5) Otherwise, the IP-SM-GW correlates an MSISDN to this chat session. Any SMS sent from the SMS user to this MSISDN should be interworked into the chat session with which this MSISDN is correlated. The IP-SM-GW shall use the SC Address in the subscriber data retrieved from the HSS at registration or provisioned by configuration and translates the chat session invitation request to a Short Message (SMS-SUBMIT) carrying an SC Address, then forwards it towards the SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). The text in the Short Message is defined by the operator and should convey information to the SMS user that he is invited to send and receive messages in the context of a chat session, and include instructions on how to accept, reject and end the session. If no response is received in time, the IP-SM-GW will consider the session rejected and send an appropriate response to the session invitation.

NOTE 3:   The MSISDN used as the sender of the Short Message is either the MSISDN of the CPM user or one that is assigned by the IP-SM-GW, depending on operator configuration.

6)   The SMS-IWMSC forwards the Short Message (SMS-SUBMIT) to the SMS-SC and the SMS is delivered to the SMS user using standard SMS procedures (see TS 23.040 [2]).

7)   A Short Message is sent by the SMS user via the SMS-GMSC to the IP-SM-GW in accordance to steps 2 to 4 and steps 10 to 13 from clause 6.14.

8)   If the answer is positive, the IP-SM-GW acknowledges the session invitation. Otherwise the IP-SM-GW will consider the session rejected and send back an appropriate response.

9)   Session invitation acknowledgement is forwarded by S-CSCF to the CPM UE.

NOTE 4:   The following steps are executed only if an SMS with a positive answer is received from the SMS user or if the operator policy indicated that the session is accepted without SMS user interaction. If a negative response to the invitation is received or if no response from the SMS user is received within an operator defined time, the IP-SM-GW will send a negative response to the chat invitation.

NOTE 5:   Steps 10 to 12 are repeated for each message sent from the CPM user towards the SMS user, and steps 13 to 14 are repeated for each message sent from the SMS user towards the CPM user.

10) The CPM user sends a message within the chat session containing data to the recipient SMS user.

11) The IP-SM-GW transforms the received message into a Short Message and sends a Short Message (SMS-SUBMIT) carrying the SC Address, then forwards it towards the SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). According to operator policy, each SMS generated for the SMS user may include text instructions on how to leave the chat session.

12) The SMS-IWMSC forwards the Short Message (SMS-SUBMIT) to the SMS-SC and the SMS is delivered to the SMS user using standard SMS procedures (see TS 23.040 [2]).

13) A Short Message is sent by the SMS user via the SMS-GMSC to the IP-SM-GW in accordance to steps 2 to 13 from clause 6.14.

NOTE 6:   Step 5 of the flow in clause 6.14 becomes this: The IP-SM-GW identifies that a session exists between the SMS user and the CPM user.

6.15.2   IP-SM-GW in the terminating network

The SMS user (SMS UE B) in this flow is a CPM user (CPM user B) whose preferences are set in his home network to receive his incoming chat sessions as Short Messages.
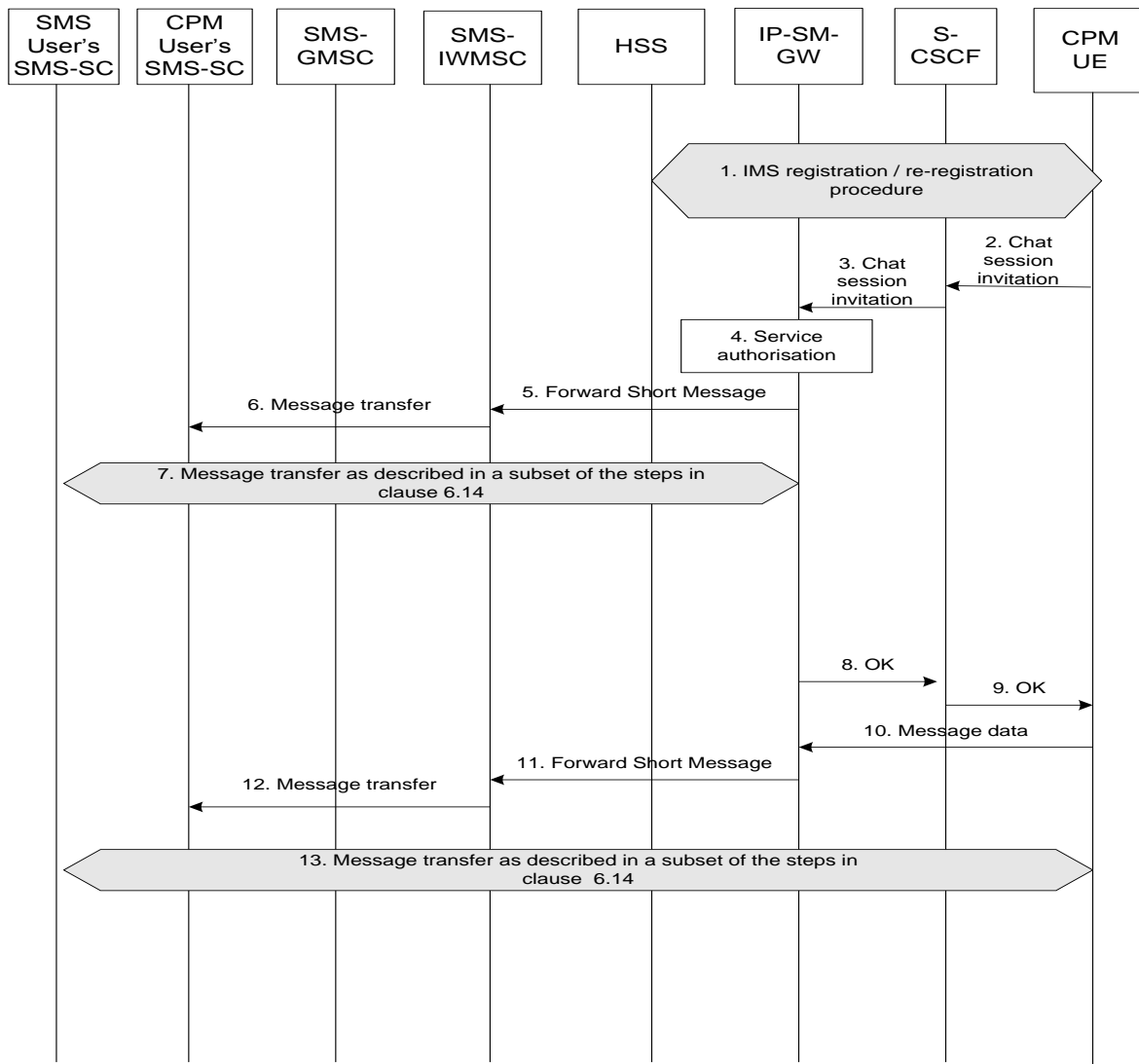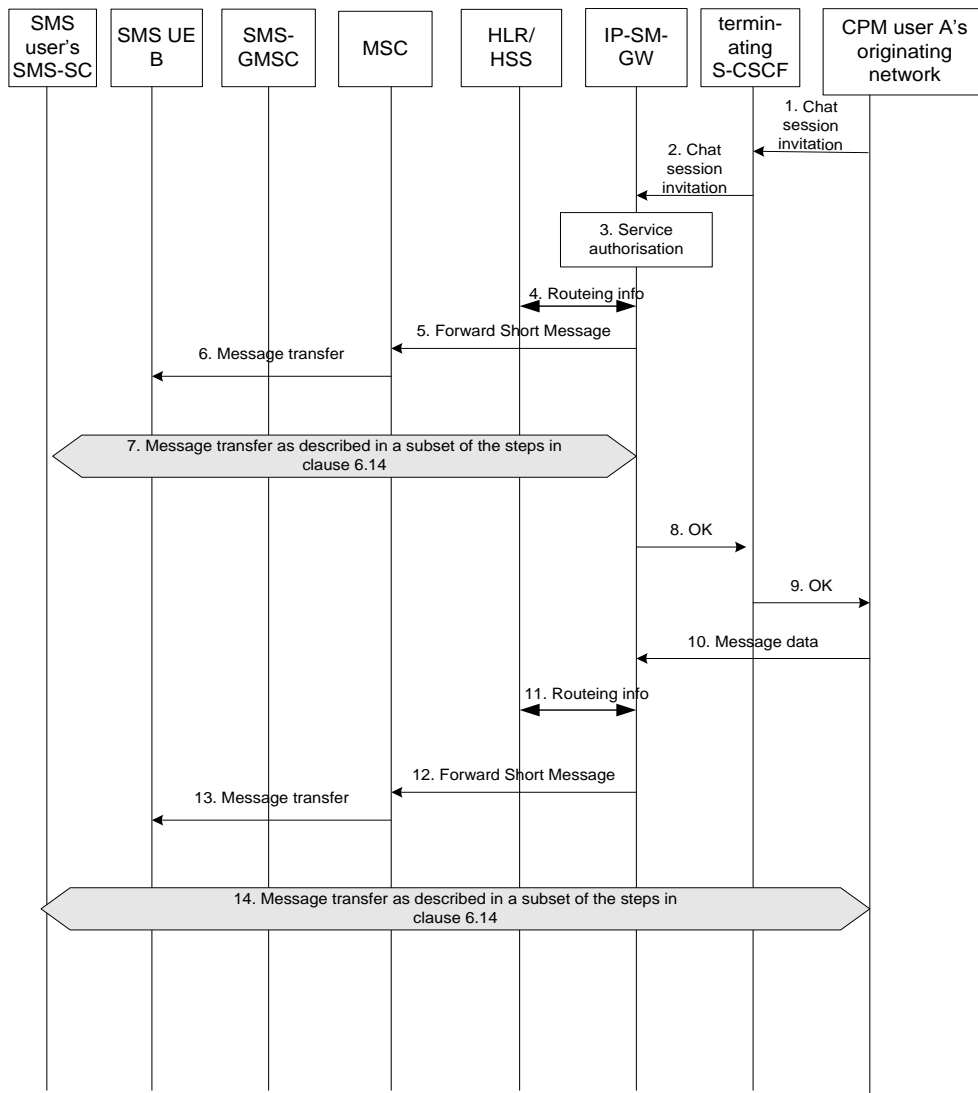
Figure 6.15.2: Chat session invitation to SMS user and message data exchange (IP-SM-GW in terminating network)

1) The originating network for CPM user A sends a session invitation request for a chat session to a CPM user (CPM user B) in another IMS domain, using the appropriate SIP method. The UE may request to hide its Public User Identity from the recipient within the session invitation. The originating S-CSCF (not shown) resolves the destination domain and routes the session invitation towards the S-CSCF in the terminating network ("terminating S-CSCF").

2) The terminating S-CSCF forwards the session invitation to the IP-SM-GW based on stored iFC.

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

3) Authorization to continue is checked. If the sender of the session invitation asks to hide its Public User Identity from the recipient and operator policy allows for this, the IP-SM-GW shall anonymise the identity of the user in all messages it sends to the recipient. If operator policy prohibits anonymity, or if the IP-SM-GW cannot identify the sending party and the operator prohibits session invitations from unidentified users, the IP-SM-GW shall not perform interworking and send back an appropriate response.

NOTE 2: Steps 5 to 7 are only executed if the operator policy is to check back with the SMS user before accepting the invitation on behalf of the SMS user. Otherwise, the process continues with step 8, as if the SMS user has responded with an acceptance of the chat session invitation.

4) The IP-SM-GW performs service-level interworking by converting the chat session invitation request to a Short Message. The IP-SM-GW obtains the routeing information for the destination UE from the HLR/HSS.

5) The IP-SM-GW sends the Forward Short Message message to the target MSC. The IP-SM-GW assigns an MSISDN representing the chat session to ensure that the reply to this SMS is sent back to this particular IP-SM-GW. Any SMS sent from the SMS user to this MSISDN should be interworked into the chat session with which this MSISDN is correlated. The text in the Short Message is defined by the operator and should convey information to the SMS user that he is invited to send and receive messages in the context of a chat session, and include instructions on how to accept, reject and end the session. The identity of the original sender (CPM user or group) is included as part of the operator provided invitation text. If no response is received in time, the IP-SM-GW will consider the session rejected and send an appropriate response to the session invitation.

6) The MSC sends the Short Message to the SMS user.

7) A Short Message is received via the SMS-GMSC from the SMS user by the IP-SM-GW, in accordance to steps 2 to 4 and steps 10 to 13 of clause 6.14, indicating the response to the chat session invitation. The message is targeted to the MSISDN representing the chat session which was assigned in step 5.

8) If the answer is positive, the IP-SM-GW acknowledges the session invitation. Otherwise the IP-SM-GW will consider the session rejected and send back an appropriate response.

9) The session invitation acknowledgement is forwarded by S-CSCF to the CPM UE.

NOTE 3:   The following steps are executed only if an SMS with a positive answer is received from the SMS user or if the operator policy indicated that the session is accepted without SMS user interaction. In case a negative response to the invitation is received or if no response from the SMS user is received within an operator defined time, the IP-SM-GW will send a negative response to the chat invitation.

NOTE 4:   Steps 10 to 13 are repeated for each message sent from the CPM user towards the SMS user, and step 14 is repeated for each message sent from the SMS user towards the CPM user.

10) The CPM user sends a message within the chat session containing data to the recipient SMS user.

11) The IP-SM-GW transforms the received message into a Short Message and obtains the routeing information for the destination UE from the HLR/HSS.

12) The IP-SM-GW sends a Short Message (SMS- DELIVER) towards the MSC, as described in TS 23.040 [2]. The IP-SM-GW inserts the MSISDN representing the chat session as the sender of the message, to ensure that the reply to this SMS is sent back to it.

13) The MSC forwards the Short Message (SMS- DELIVER) to the SMS user, and the SMS is delivered to the SMS user using standard SMS procedures as described in TS 23.040 [2]).

14) A Short Message is received via the SMS-GMSC from the SMS user by the IP-SM-GW, in accordance to steps 2 to 13 from clause 6.14. The message is targeted to the MSISDN representing the chat session which was assigned in step 5.

NOTE 5:   Step 5 of the flow in clause 6.14 becomes this: "The IP-SM-GW identifies that a session exists between the SMS user and the CPM user".

6.16   Service-level Interworking: CPM capable UE tearing down a Chat session between a CPM user and an SMS user

NOTE: This is a new clause to be added to TS 23.204.

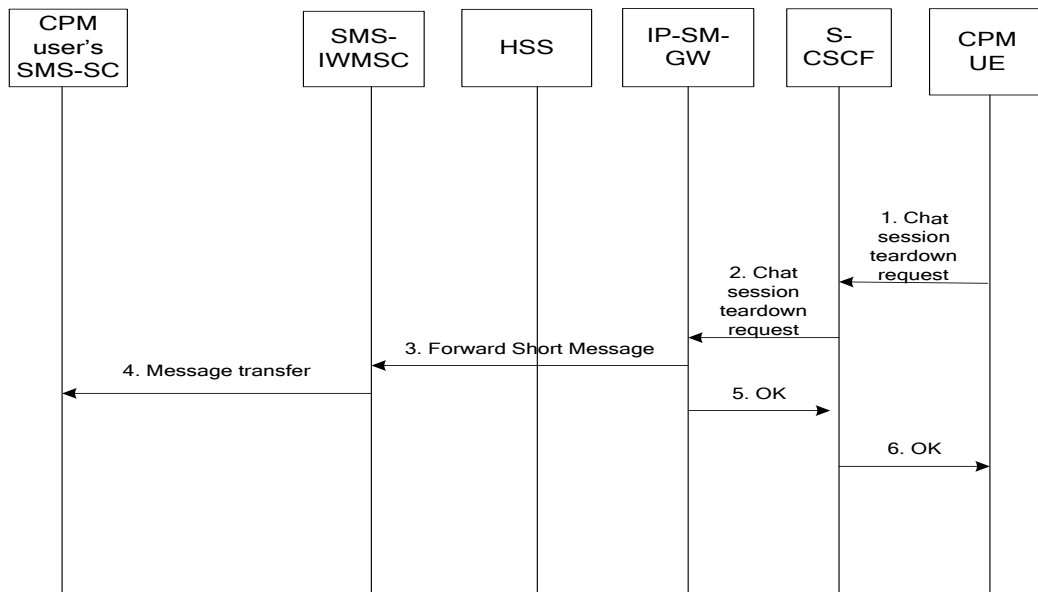## 6.16.1 IP-SM-GW in the originating network

Figure 6.16.1: Chat session teardown request to SMS (IP-SM-GW in originating network)

1) The CPM UE sends a SIP BYE for an ongoing session to the S-CSCF.

2) S-CSCF forwards the session teardown request to the IP-SM-GW. The IP-SM-GW performs service-level interworking by converting the session teardown request to a Short Message (SMS-SUBMIT) carrying the SC Address and including operator provided teardown text. The IP-SM-GW uses the SC Address in the subscriber data retrieved from the HSS at registration or provisioned by configuration.

3) The IP-SM-GW forwards the Short Message towards the SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). The text in the Short Message is defined by the operator and should convey information to the SMS user that the chat session is ending.

NOTE 1: The MSISDN used as the sender of the Short Message is either the MSISDN of the CPM user or one that was assigned by the IP-SM-GW at session establishment, depending on operator configuration.

4) The SMS-IWMSC forwards the Short Message (SMS-SUBMIT) to the SMS-SC (see TS 23.040 [2]).

NOTE 2: Steps 3 to 4 are only executed if the operator policy requires that the SMS user be told the session is being torn down. Otherwise, the process continues with step 5.

5) The IP-SM-GW acknowledges the session teardown request and tears down the associated resources.

6) The session teardown acknowledgement is forwarded by the S-CSCF to the CPM UE.

6.16.2 IP-SM-GW in the terminating network

The SMS user (SMS user B) in this flow is a CPM user (CPM user B) who has set his preferences in his home network to receive his incoming chat sessions as Short Messages.

Figure 6.16.2: Chat session teardown request to SMS (IP-SM-GW in terminating network)

1) The CPM user's originating network sends a session teardown request for an ongoing chat session to the terminating S-CSCF.

2) The terminating S-CSCF forwards the session teardown request to the IP-SM-GW serving the SMS user. The IP-SM-GW performs service-level interworking by converting the session teardown request to a Short Message including operator provided teardown text.

3) The IP-SM-GW obtains the routeing information for the destination UE from the HLR/HSS.

4) The IP-SM-GW sends the Forward Short Message to the target MSC. The IP-SM-GW inserts the MSISDN it had previously assigned to represent this chat session as the sender of the message.

NOTE: Steps 3 to 5 are only executed if the operator policy requires that the SMS user be told the session is being torn down. Otherwise, the process continues with step 6.

5) The MSC sends the Short Message to the SMS user.

6) The IP-SM-GW acknowledges the session teardown request and tears down the associated resources.

7) The session teardown acknowledgement is forwarded by S-CSCF towards the CPM user's originating network.

6.17 Service-level Interworking: SMS user requesting the IP-SM-GW to tear down the Chat session between a CPM user and an SMS user

NOTE: This is a new sub-clause to be added to TS 23.204.

6.17.1 IP-SM-GW in the originating network

Figure 6.17.1: Chat session teardown request to CPM UE (IP-SM-GW in originating network)

1) A message is received from the SMS user via the SMS-GMSC by the IP-SM-GW, in accordance to steps 2 to 4 and steps 10 to 13 of clause 6.14, with the operator defined Short Message indicating the SMS user wants to leave the chat session.

2) The IP-SM-GW performs service-level interworking by recognizing that the Short Message corresponds to the operator defined teardown text indicating the SMS user wants to leave the chat session, so the IP-SM-GW sends a chat session teardown request.

3) The session teardown request is forwarded by S-CSCF to the CPM UE.

4) The CPM UE acknowledges the session teardown request.

5) The acknowledgement is forwarded by the S-CSCF to the IP-SM-GW.

6.17.2 IP-SM-GW in the terminating network

The SMS user in this flow is a CPM user who has set his preferences in his home network to receive his incoming chat sessions as Short Messages.

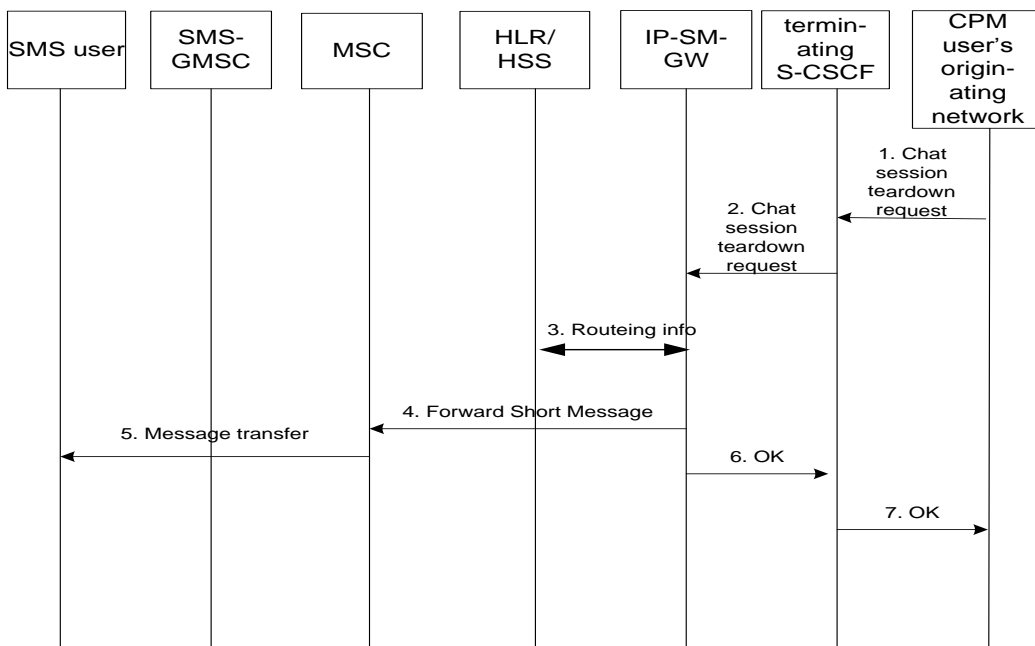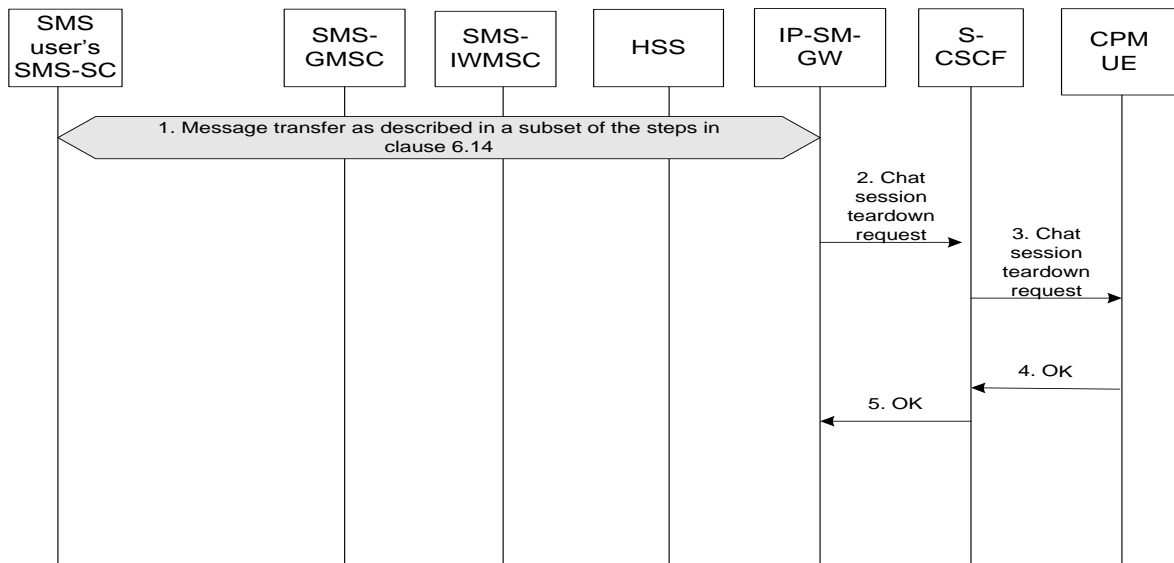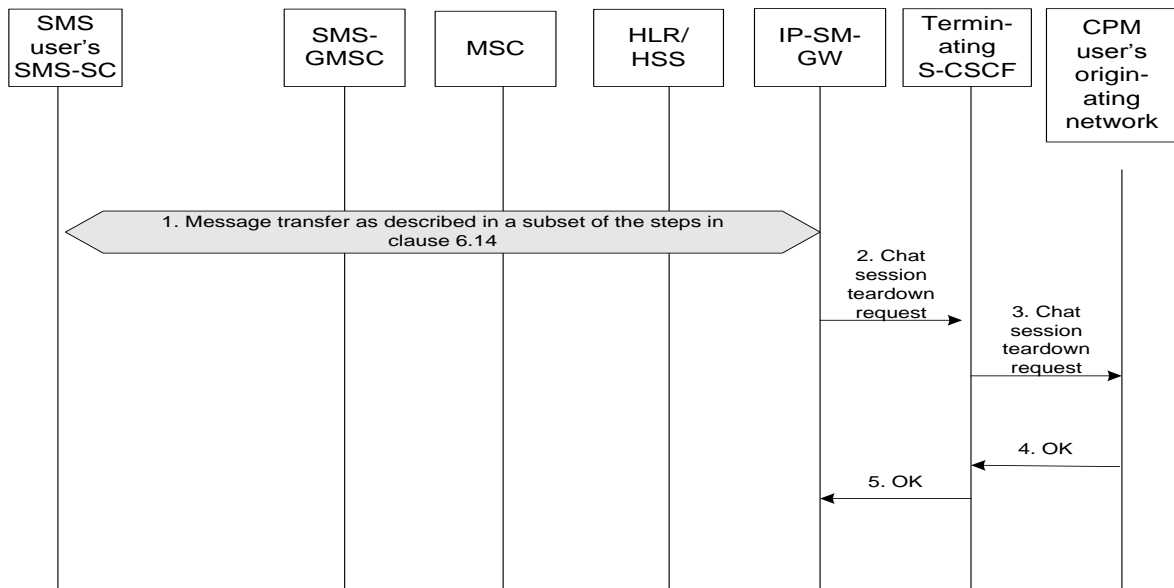**Figure 6.17.2: Chat session teardown request to CPM UE (IP-SM-GW in terminating network)**

1) A message is received from the SMS user via the SMS-GMSC by the IP-SM-GW, in accordance to steps 2 to 4 and steps 10 to 13 of clause 6.14, with the operator provided teardown text indicating the SMS user wants to leave the chat session.

2) The IP-SM-GW performs service-level interworking by recognizing that the Short Message corresponds to the operator provided teardown text indicating the SMS user wants to leave the chat session, so the IP-SM-GW sends a chat session teardown request.

3) The session teardown request is forwarded by the S-CSCF towards the CPM user's originating network.

4) The CPM user's originating network acknowledges the session teardown request and tears down the associated resources.

5) The acknowledgement is forwarded by the S-CSCF to the IP-SM-GW.

6.18 Service-level interworking: Status Report procedure for chat session message to Short Message interworking

Figure 6.18: Status report procedure for chat session message to Short Message interworking

1) A chat session message from the UE is successfully delivered to the SMS user after service-level interworking according to clause 6.15. The chat session message requested a success or failure delivery report.

NOTE 1: A Request for success or failure delivery report can be requested in a chat session message sent by the UE as described in IETF RFC 4975 [19].

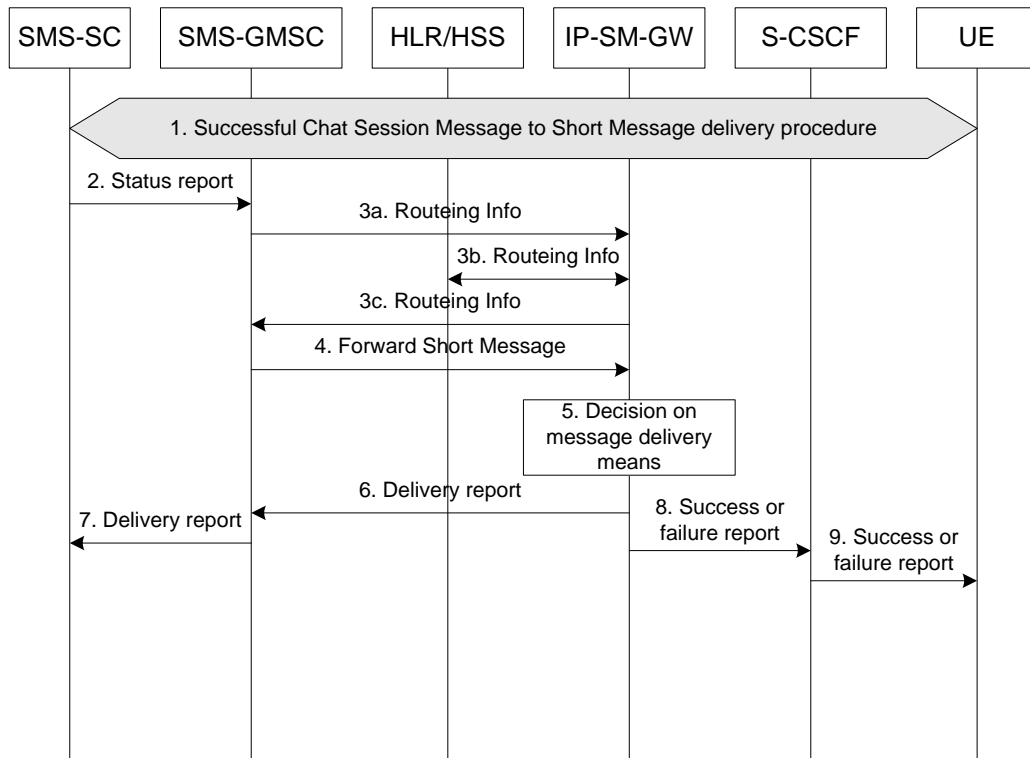2) The SMS-SC sends a Status report to the SMS-GMSC.

NOTE 2: The Status report, from the SMS-GMSC's point of view, will be treated as any SM termination.

NOTE 3: The Status report is an optional message.

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

3b) The HLR/HSS returns the IMSI and the address(es) of the current MSC and/or SGSN to the IP-SM-GW for delivery of the Short Message in CS/PS domain.

3c) The IP-SM-GW creates a MT Correlation ID as per TS 23.040 [2], which associates the Routing Info retrieval with the subsequent Forward Short Message messages(s), and stores this along with the IMSI of the receiving subscriber. The IP-SM-GW returns to the SMS-GMSC the address of itself, along with the MT Correlation ID in the IMSI field, as routeing information. Alternatively, the IP-SM-GW may return the address(es) of the current MSC and/or SGSN, in which case, the subsequent procedure to forward the message is the same as defined in TS 23.040 [2].

4) The SMS-GMSC sends the status report in the Forward Short Message to the IP-SM-GW.

5) The IP-SM-GW translates and maps the Status report in the Forward Short Message into a report request as described in MSRP IETF RFC 4975 [19].

6) The IP-SM-GW sends a Delivery report (SMS-DELIVER-REPORT) to the SMS-GMSC.

7) The SMS-GMSC sends an acknowledgement back to the SMS-SC.

8-9) The IP-SM-GW sends a success of failure report based on the value in the status report.

NOTE 4: Step 6 and 8 can happen independently of each other.

Annex A:
Service-level interworking: IM or CPM user sends an Instant Message to a group list including SMS users
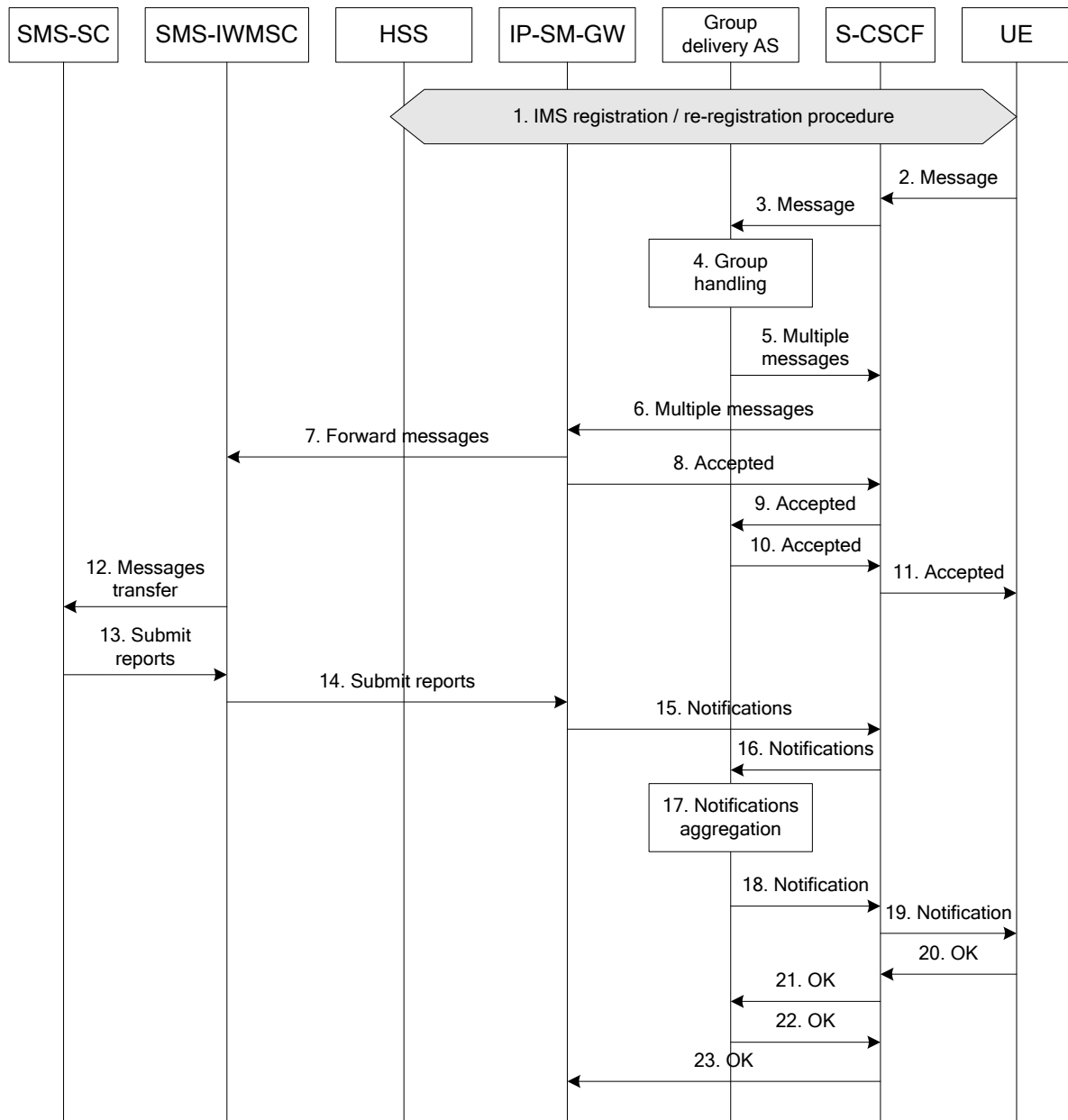
Figure A.1: IM user sends an Instant Message to a group list via service-level interworking

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

2) UE generates Instant Message which includes group information, e.g. Group identifier in the Request-URI and/or recipient list in the body of the Instant Message. UE submits the Instant Message to the S-CSCF using an appropriate SIP method.

3) Based on the stored iFC, S-CSCF forwards the Instant Message to an AS in charge of the group delivery, e.g. the controlling function server defined in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or the controlling function server defined in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

4) The group delivery AS replicates per Instant Message for per recipient according to the group information it obtains acting as a B2BUA. See detail in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

5) The group delivery AS sends the generated multiple Instant Messages to S-CSCF (e.g., the Instant Messages can be delivered as what the list server does defined in the TS 24.247 [14]).

6) The S-CSCF forwards the Instant Messages to the IP-SM-GW based on the stored iFC.

7) The IP-SM-GW shall decide whether to perform service-level interworking depending on SIP request header (e.g. Request-URI), operator policy, when the Instant Message is not routeable in the IMS. If IP-SM-GW decided to perform service-level interworking, the IP-SM-GW performs service authorization based on the stored subscriber data retrieved from the HLR/HSS at the time of the third party registration procedure as described in the clause 6.1. The IP-SM-GW shall check whether the originating subscriber is authorised to use the interworking service .If the result of service authorization is negative, the IP-SM-GW shall not forward the message, and shall return the appropriate error information to the UE in a failure report. Otherwise, the IP-SM-GW shall translate the IMS message to a Short Message (SMS-SUBMIT) and forwards it towards the SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]).

8) If service authorization is successful, the IP-SM-GW acknowledges the Instant Messages.

9-11) Instant Message acknowledgement is forwarded by S-CSCF to UE.

12) The SMS-IWMSC forwards the Short Messages (SMS-SUBMIT) to the SMS-SC (see TS 23.040 [2]).

13) The SMS-SC sends multiple Submit reports (SMS-SUBMIT REPORT) to SMS-IWMSC (see TS 23.040 [2]).

14) SMS-IWMSC sends the Submit reports to IP-SM-GW (see TS 23.040 [2]).

15) IP-SM-GW translates the received Submit reports to appropriate IMS delivery notifications defined in RFC 5438draft-ietf-simple-imdn [13], and forwards the IMS delivery notifications to the S-CSCF.

16) The S-CSCF forwards the IMS delivery notifications to the group delivery AS.

17) The group delivery AS aggregates the delivery notifications of the same type from different recipients into a single delivery notification.

18) The group delivery AS sends the delivery notification to the S-CSCF.

19) The S-CSCF forwards the delivery notification to the UE.

20-23) Acknowledgement of the delivery notification is forwarded by S-CSCF to IP-SM-GW.

Annex B:
Group chat sessions

NOTE: This is a new annex to be added to TS 23.204.

B.1 Service-level interworking: IM or CPM user initiates a group chat and sends an Instant Message to a group list including SMS users

The flow in this clause is the same as that described in clause 6.15.1 with the difference that it is required that the IP-SM-GW assign an MSISDN for this group chat session so that it is clear for the SMS user that any message sent to the assigned MSISDN will be delivered to the group chat session participants, not just to the CPM UE that invited the SMS user.

In this flow, the IP-SM-GW is in the PLMN of the CPM UE, but it could also be in the PLMN of the SMS user if that user was also a CPM user and had terminating user preferences to deliver the session invitation via SMS.
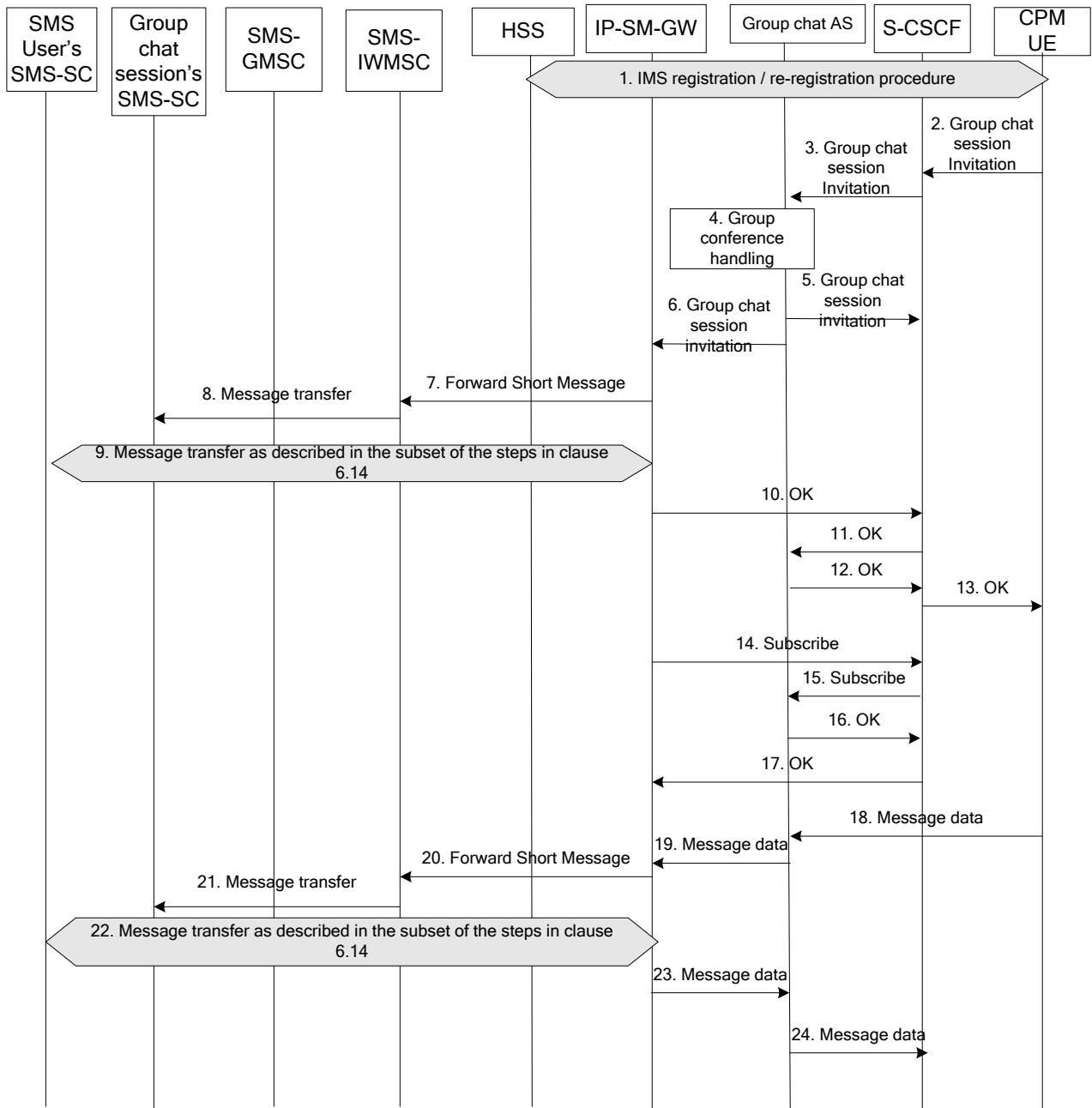
Figure B.1: CPM user initiates a group chat and messages are exchanged within the group chat via service-level interworking

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

2) The UE generates a chat session invitation which includes group information, e.g. Group identifier in the Request-URI and/or recipient list in the body of the chat session invitation. UE submits the Instant Message to the S-CSCF using an appropriate SIP method.

3) Based on the stored iFC, S-CSCF forwards the session invitation to an AS in charge of handling group chat requests, e.g., the controlling function server defined in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or the controlling function server defined in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

4) The group chat AS replicates a session invitation per recipient according to the group information it obtains acting as a B2BUA. See details in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

5) The group chat AS sends the generated multiple session invitations to the S-CSCF.

6) The group chat AS forwards one of the chat session invitations to the IP-SM-GW according to normal routing procedures (e.g., via S-CSCF).

NOTE 1: Nodes specific to the CPM functions such as ISF are either collocated with the IP-SM-GW or else are not shown.

7) The IP-SM-GW translates the chat session invitation request to a Short Message (SMS-SUBMIT) and forwards it towards the group chat SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). The IP-SM-GW assigns an MSISDN representing the group chat session to ensure that the reply to this SMS is sent back to this particular IP-SM-GW. Any SMS sent from the SMS user to this MSISDN will be interworked into the group chat session with which this MSISDN is correlated. The text in the Short Message is defined by the operator and conveys information to the SMS user that he is invited to send and receive messages in the context of a group chat session, and includes instructions on how to accept, reject and end the session. The identity of the original sender (CPM user or group) is included as part of the operator provided invitation text.

8) The SMS-IWMSC forwards the Short Messages (SMS-SUBMIT) to the group chat SMS-SC and the SMS is delivered to the SMS user using standard SMS procedures (see TS 23.040 [2]).

9) A Short Message is received from the SMS user via the SMS-GMSC by the IP-SM-GW, in accordance to steps 2 to 4 and steps 10 to 13 from clause 6.14, indicating the response to the group chat session invitation. The message is targeted to the MSISDN representing the group chat session which was assigned in step 7.

10) If the answer is positive or if operator policy is to accept the session invitation on behalf of the SMS user, the IP-SM-GW acknowledges the session invitation. Otherwise the IP-SM-GW will consider the session rejected and send back an appropriate response.

11) The session invitation acknowledgement is forwarded by S-CSCF to the group chat AS.

12-13) The group chat AS responds back to the group chat session initiator once the first user joins the group chat session.

NOTE 2: The following steps are executed only if an SMS with a positive answer is received from the SMS user or if the operator policy indicated that the session is accepted without SMS user interaction. In case a negative response to the invitation is received or if no response from the SMS user is received within an operator defined time, the IP-SM-GW shall send a negative response to the chat invitation.

14-17) The IP-SM-GW subscribes to the participant information changes.

NOTE 3: Steps 18 to 21 are repeated for each message sent from any group chat session participant towards the SMS user, and steps 22 to 24 are repeated for each message sent from the SMS user towards the group chat session participants.

18) The CPM UE (or any group chat session participant) sends a message containing data to the group chat AS.

19) For the group chat session participant who is an SMS user, the message is routed towards the IP-SM-GW.

20) The IP-SM-GW identifies that a session exists between the SMS user and group chat AS and transforms the received message into a Short Message and sends a Short Message (SMS-SUBMIT) carrying the SC Address, then forwards it towards the group chat SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). The IP-SM-GW inserts the address representing the group chat session as the sender of the message to ensure that the reply to this SMS is sent back to this particular IP-SM-GW.

21) The SMS-IWMSC forwards the Short Message (SMS-SUBMIT) to the group chat SMS-SC and the SMS is delivered to the SMS user using standard SMS procedures (see TS 23.040 [2]).

22) A Short Message is received from the SMS user via the SMS-GMSC by the IP-SM-GW, in accordance to steps 2 to 13 from clause 6.14. The message is targeted to the MSISDN representing the group chat session which was assigned in step 7.

NOTE 4: Step 5 of the flow in clause 6.14 becomes this: The IP-SM-GW identifies that a session exists between the SMS user and the CPM user. Steps 6 and 7 of the flow in clause 6.14 are replaced by steps 23 and 24 in this flow.

23) The IP-SM-GW identifies that a session exists between the SMS user and the group chat AS and transforms the received message into message data and sends it within the session towards the group chat AS.

24) The group chat AS forwards the message to all group chat participants.

B.2 Service-level interworking: CPM user extends a one-to-one chat session into a group chat session

This flow is the same as that described in clause 6.15.1 with the difference that it is required that the IP-SM-GW assign an MSISDN when this group chat session starts if one was not assigned before, so that it is clear for the SMS user that any message sent to the assigned MSISDN will be delivered to the group chat session participants, not just to the CPM UE that invited the SMS user.

In this flow, the IP-SM-GW is in the PLMN of the CPM UE, but it could also be in the PLMN of the SMS user if that user was also a CPM user and had terminating user preferences to deliver the session invitation via SMS.
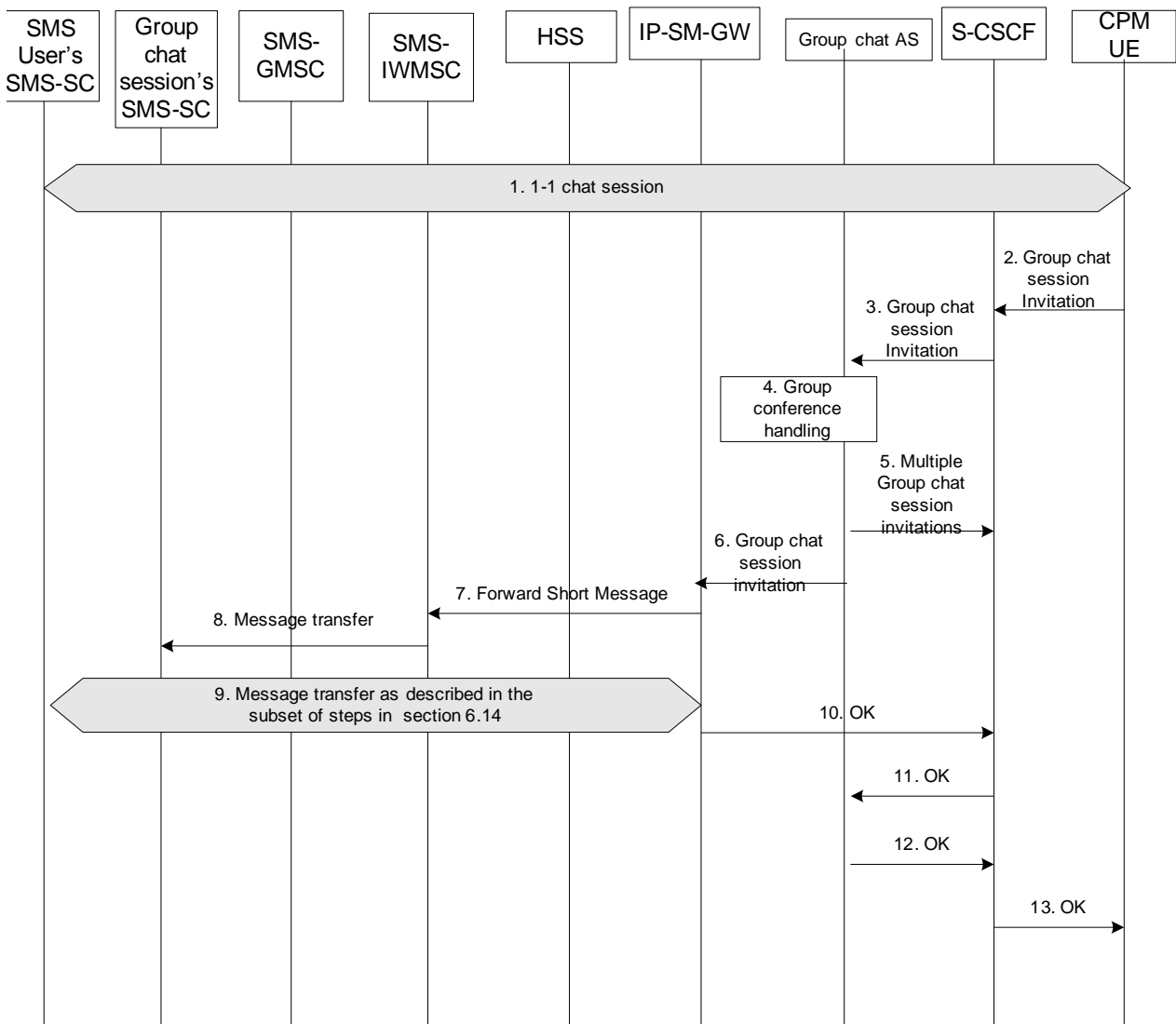
Figure B.2: CPM user modifies a one-to-one chat session into a group chat session

1) A one-to-one chat session is established between the CPM user and the SMS user.

2) The UE generates a chat session invitation which includes a recipient list in the body of the chat session invitation. The original SMS user who is part of the one-to-one chat session is included in that list An indication

is added for the original SMS user in the list that the existing one-to-one session is to be replaced by the new session. The UE submits the chat session invitation to the S-CSCF.

3) Based on the stored iFC, S-CSCF forwards the session invitation to an AS in charge of handling group chat requests, e.g., the controlling function server defined in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or the controlling function server defined in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

4) The group chat AS replicates a session invitation per recipient according to the group information it obtains acting as a B2BUA. See details in OMA-TS-SIMPLE_IM-V1_0-20070816-C [12] or in OMA-TS-CPM_Conv_Fnct-V1_0-20091222-D [17].

5) The group chat AS sends the generated multiple session invitations to the S-CSCF.

6) The group chat AS sends one of the chat session invitations to the IP-SM-GW according to normal routing procedures (e.g., via S-CSCF). The chat session invitation will indicate that the existing session is to be replaced with a new session.

7) The IP-SM-GW translates the chat session invitation request to a Short Message (SMS-SUBMIT) and forwards it towards the group chat SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). The IP-SM-GW assigns an MSISDN representing the group chat session, if one was not assigned for the one-to-one chat session, to ensure that the reply to this SMS is sent back to this particular IP-SM-GW. Any SMS sent from the SMS user to this MSISDN will be interworked into the group chat session with which this MSISDN is correlated. The text in the Short Message is defined by the operator and conveys information to the SMS user that the one-to-one session has been transformed into a group session and that he is invited to send and receive messages in the context of a group chat session, and includes instructions on how to accept, reject and end the session. The identity of the original sender (CPM user or group) is included as part of the operator provided invitation text.

8) The SMS-IWMSC forwards the Short Messages (SMS-SUBMIT) to the group chat SMS-SC and the SMS is delivered to the SMS user using standard SMS procedures (see TS 23.040 [2]).

9) A Short Message is received from the SMS user via the SMS-GMSC by the IP-SM-GW, in accordance to steps 2 to 4 and steps 10 to 13 from clause 6.14, indicating the response to the group chat session invitation. The message is targeted to the MSISDN representing the group chat session which was assigned in step 7.

10) If the answer is positive or if operator policy is to accept the session invitation on behalf of the SMS user, the IP-SM-GW acknowledges the session invitation. Otherwise the IP-SM-GW will consider the session rejected and sends back an appropriate response.

11) The session invitation acknowledgement is forwarded by S-CSCF to the group chat AS.

12-13) The group chat AS responds back to the group chat session initiator once the first user joins the group chat session.

B.3 Service-level interworking: IP-SM-GW informs SMS users about group chat participant changes

In this flow, the IP-SM-GW is in the PLMN of the CPM UE, but it could also be in the PLMN of the SMS user if that user was also a CPM user and had terminating user preferences to deliver the session invitation via SMS.
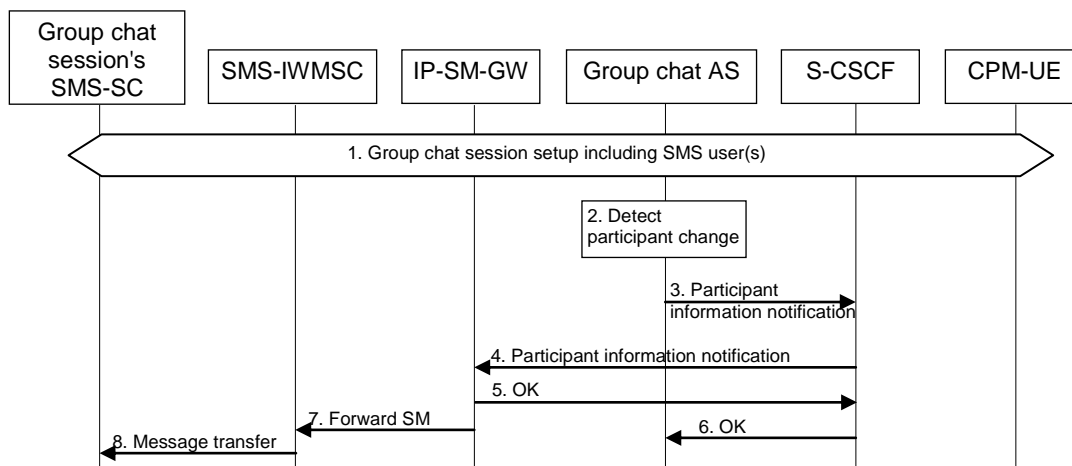
Figure B.3: Sending participant information changes to an SMS user in a group chat session

1) A group chat session including SMS user(s) set up by an IM or CPM user as described in clause B.1 steps 1-17.

2) The group chat AS detects change in participants of the group chat session (e.g. participant added or left the group chat session, that event is not shown in the flow).

3-4) As the IP-SM-GW has subscribed to participant information changes, the group chat AS notifies the IP-SM-GW about the participant change through the S-CSCF using an appropriate SIP method.

5-6) The IP-SM-GW acknowledges the notification.

7) According to operator policy, the IP-SM-GW translates the participant change notification to a Short Message (SMS-SUBMIT) and forwards it towards the group chat SMS-SC (SC Address) via the SMS-IWMSC (as described in TS 23.040 [2]). The text in the Short Message is defined by the operator and conveys appropriate information to the SMS user.

8) The SMS-IWMSC forwards the Short Messages (SMS-SUBMIT) to the group chat SMS-SC and the SMS is delivered to the SMS user using standard SMS procedures (see TS 23.040 [2]).

Annex Y:
Checklist of service requirements for CPM - SMS interworking

NOTE: The contents of this Annex will not be transferred to TS 23.204.

The following table lists the service requirements specified in TS 22.340 [s], clause 11.3 and clarifies how they are fulfilled by the present TR.

Table Y.1

#	Service requirement	Requirement fulfilled?
1	**Pre Release 10 UE** shall be supported by SMS-Session based messaging service-level interworking	**Yes**: the solution detailed in this TR has no impact on the UE.
2	it shall be possible for a session based messaging user to send a messaging **session invitation** to an SMS user	**Yes**: covered in clause 6.15
3	When interworking from a Session based message to an SMS message, the network should deliver all content types in the **Session based message to equivalent SMS** content types where they exist	**Yes**: covered in clause 6.15.
4	When interworking from an SMS message to a Session based message, the network should deliver all content types in an **SMS message to equivalent Session based message** content types where they exist	**Yes**: covered in clause 6.15.
5	If an SMS user requests an SMS status report, then an **SMS status report** should be generated when the message is delivered using Session based message and a success or failure delivery notification has been received from the Session based message user	**Yes**: An SMS status report is based on information received in the SMS Delivery report and SMS Delivery reports for session based messages are covered in clause 6.14.
6	If a Session based message user requests a notification that the message was delivered to the recipient, an SMS status report should be generated when the message is delivered to the SMS user's client; an SMS status report should be communicated to a Session based message user as a **delivery notification**	**Yes**: covered in clause 6.18.
7	A session invitation sent towards an SMS user is handled in one of 3 ways (dependent on service provider policies): 1. The session invitation is **accepted** by the network on behalf of the SMS user. 2. The session invitation is **denied** by the network on behalf of the SMS user. 3. The SMS user is asked for **consent** for accepting the session invitation	**Yes**: covered in clause 6.15
8	The **user experience** shall be consistent with the SMS and Session based messaging service level expectations to as large an extent as possible	**Yes**.
9	For session based messaging the **session based connectivity should be maintained for the SMS user** so that the SMS user could - **participate** in the session (i.e. exchange messages) - **exit** the session (no more message exchange) according to the instruction embedded in the SMS message	**Yes**. Participation of the SMS user in the session: covered in clause 6.15. Exit: covered in clause 6.16
10	When interworking a session invitation from a Session based messaging service to an SMS message and a form of anonymity has been requested by the sending party and the **operator of the interworking function cannot identify the sending party**, subject to operator policy, interworking shall be suppressed for that session invitation. Subject to operator policy and / or the ability to identify the sending party, the sending party may be informed that the session invitation could not be delivered	**Yes**: covered in clause 6.15.2.
11	When interworking a session invitation from a Session based messaging service to an SMS message, it shall be possible for the sender of the session invitation to request to **hide its public ID** from the recipient (e.g. be an anonymous sender). In this case the sender's public ID shall not be delivered to the recipient subject to operator policy	**Yes**: covered in clause 6.15
12	It shall be possible to generate the appropriate **charging**-related information and provide the appropriate online charging mechanism (if it is applied for the SMS and/or Session based messaging services) for the interworking services. Such charging related information shall take into account the one-to-many relationship of messages sent to a session	**Yes**: no change required for SA2.

Annex Z:
Change history

NOTE: The contents of this Annex will not be transferred to TS 23.204.

Change History

Change history								
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2010-0	SP-47	SP-100172	-	-	MCC Update to version 2.0.0 for presentation to TSG SA for approval	1.1.0	2.0.0
2010-03	-	-	-	-	MCC Update to version 10.0.0 after approval at TSG SA#47.	2.0.0	10.0.0