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TECHNICAL SPECIFICATION

**Universal Mobile Telecommunications System (UMTS);
LTE;
Support of Short Message Service (SMS) over generic 3GPP
Internet Protocol (IP) access;
Stage 2
(3GPP TS 23.204 version 16.0.0 Release 16)**



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Foreword

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

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Introduction

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

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

1 Scope

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

- 1 Enhancements to the HSS;
- 2 Communication between the SMS-GMSC/SMS-IWMSC and the HSS;
- 3 Authentication of service usage and registration;
- 4 Transfer of 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.
- 6 Mechanisms to handle MT-SMS without MSISDN to IMS UE, and SMS between IMS UEs that support MSISDN-less SMS operation.

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 [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 [12].

The document also specifies the capabilities and enhancements needed to support service level interworking for the Short Message service, as defined in the TS 23.040 [2] and in this specification and the OMA CPM service as defined in OMA-TS-CPM_Conv_Funct-V1_0 [17]. The features supported from the CPM specification are the exchange of short or large immediate messages in pager mode, as well as session-based messaging.

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-TS-SIMPLE_IM-V1_0: "Instant Messaging using SIMPLE", <http://www.openmobilealliance.org/>.
- [13] IETF RFC 5438: "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-RD-CPM-V1_0: "CPM Requirements", <http://www.openmobilealliance.org/>.
- [16] OMA-AD-CPM-V1_0: "CPM Architecture", <http://www.openmobilealliance.org/>.
- [17] OMA-TS-CPM_Conv_Funct-V1_0: "CPM Conversation Functions", <http://www.openmobilealliance.org/>.
- [18] 3GPP TS 22.340: "IP Multimedia System (IMS) messaging; Stage 1".
- [19] IETF RFC 4975: "The Message Session Relay Protocol (MSRP)", September 2007.
- [20] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".
- [21] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [22] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".
- [23] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [24] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

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 [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 [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 [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 [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 [16]. The Interworking Selection Function selects an Interworking Function that should perform the actual interworking between CPM and SMS.

MSISDN-less SMS operation: operation to support SMS communication without the need of MSISDN in the UE's IMS subscription profile.

MSISDN-less Correlation ID: information element which consists of Receiver Identity (i.e. SIP-URI of B party), Sender Identity (i.e. SIP-URI of A party), and HLR Identity (i.e., HLR that serves the B party).

Non-supporting MSISDN-less SMS UE: a UE which does not support MSISDN-less SMS operation as defined in this specification.

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

SMSF: the SMS Function as defined in TS 23.501 [23].

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

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

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

- A registration and de-registration mechanism shall be supported where UEs are required to explicitly indicate their ability to send and receive encapsulated Short Messages.
- It shall provide for the transport of Short Message Service TP layer PDUs (TS 23.040 [2]) and associated RP layer information.

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 [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_Funct-V1_0 [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 [12] or of the CPM service enabler as described in OMA TS CPM_Conv_Funct-V1_0 [17]. Existing security mechanisms for 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.

4a.4 SMS without MSISDN

For SMS without MSISDN interworking, the architecture allows for the following in addition to clause 4a.2:

- It shall provide for the transport of Mobile Terminating Short Message Service to UE without the need of MSISDN in the UE's IMS subscription profile.
- It shall provide for the transport of Mobile Originating Short Message Service from IMS UE that supports MSISDN-less SMS operation to other IMS UE.

4a.5 SMS without MSISDN interworking with Non-supporting MSISDN-less SMS UE

This version of the specification does not require the support of SMS communication between IMS UE that supports MSISDN-less SMS operation as defined in this specification and non-supporting MSISDN-less SMS UE.

NOTE: It is up to implementation on the IMS network that supports the MSISDN-less SMS operation to determine how to interwork with non-supporting MSISDN-less SMS UE if required.

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.

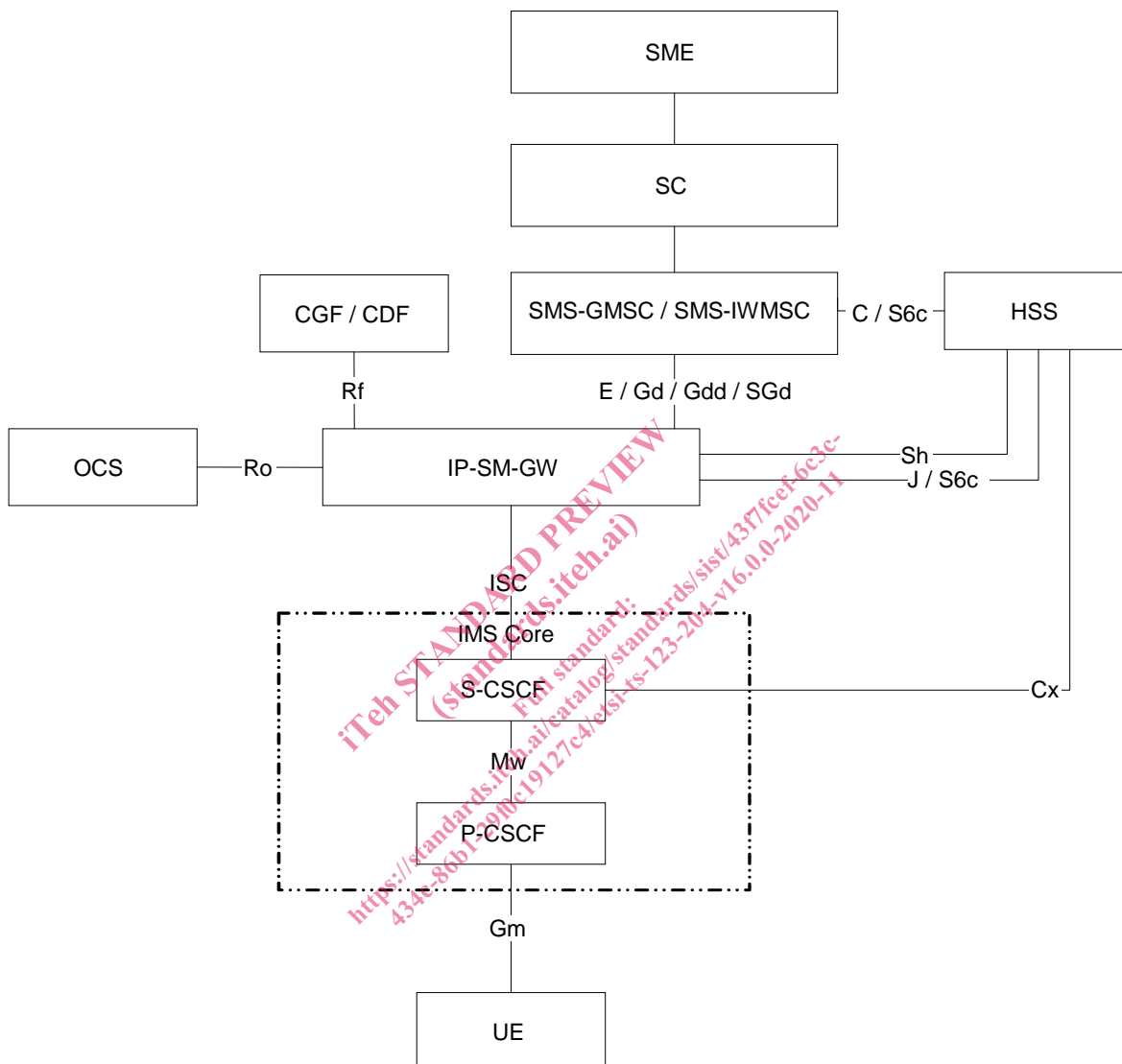


Figure 5.1: Architecture for providing SMS over a generic IP-CAN

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

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

5.2.2 C/S6c interface

The C or S6c interface allows the SMS-GMSC, using MAP or a Diameter based protocol, to obtain the address of the IP-Message-GW via mechanisms described in clause 5.3.

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

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

- Supporting the registration and de-registration from the IP-SM-GW to the HLR/HSS for SMS delivery.
- Forwarding of the Send Routing Information for Short Message requests from HLR/HSS to IP-SM-GW in order to return the address where the SM should be forwarded.
- Interrogating the HLR/HSS using Send Routing Information for Short Message to retrieve the IMSI and the current MSC, SGSN, MME and/or SMSF addresses.
- Informing the HLR/HSS when a memory capacity exceeded condition ceases.
- Retrieving SMS related data from the HLR/HSS: subscriber data of the short message service similar to the data for the current CS/PS domain and additional service data on the service authorisation of the encapsulated short message delivery via IMS, SC address for service-level interworking from Instant Message to Short Message if the SC address is stored in the HLR/HSS.

Both a Sh interface and either a J or S6c interface can be deployed between the IP-SM-GW and the HLR/HSS. During the functional allocation the change on existing MAP functions, when used, should be minimized. The deployment of the J or S6c interface is mandatory, since it is used for forwarding the SRI for SM message.

5.2.4 E/Gd/Gdd/SGd interface

The E/Gd/Gdd/SGd interface allows the IP-SM-GW to connect to the SMS-GMSC, appearing to the SMS-GMSC as an MSC, SGSN, MME or SMSF.

For interworking with SMS in MME as defined in TS 23.272 [22], Annex C, an IWF may be used as described in that clause.

For interworking with an SGSN supporting the Gdd interface, an IWF may be used as described in TS 23.060 [21].

5.2.5 ISC interface

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

5.2.6 Void

5.3 Functional entities

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

5.3.1.1 General

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

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

- to determine the domain (CS/PS or IMS) for delivery of a Short Message;