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Foreword

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

The present document defines the Short Message Service (SMS) support on mobile radio interface within the 3GPP system.

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;

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1 Scope

The present document specifies the procedures used across the mobile radio interface by the signalling layer 3 function Short Message Control (SMC) and Short Message Relay function (SM-RL) for circuit switched in A/Gb mode, GPRS, EPS, and 5GS.

1.1 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*.

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[1] Void.

[1a] 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)".

[3a] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[3] 3GPP TS 44.006: "Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification".

[4] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[5] 3GPP TS 24.008: "Mobile radio interface layer 3 specification".

[5a] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification".

[5b] 3GPP TS 33.102: "3G Security; Security Architecture".

[5c] 3GPP TS 42.017: "Subscriber Identity Modules (SIM); Functional characteristics".

[6a] 3GPP TS 44.064: "General Packet Radio Service (GPRS); Logical Link Control (LLC) layer specification ".

[6] ISO 7498: "Information processing systems - Open Systems Interconnection - Basic Reference Model".

[7] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol".

[8] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".

[9] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access"

[10] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3"

[11] 3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2"

[12] 3GPP TS 29.118: "Mobility Management Entity (MME) – Visitor Location Register (VLR) SGs interface specification"

[13] 3GPP TS 23.501: " System Architecture for the 5G System; Stage 2".

[14] 3GPP TS 23.502: " Procedures for the 5G System; Stage 2".

[15] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[16] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[17] 3GPP TS 29.540: "5G System; SMS Services; Stage 3".

1.2 Abbreviations

For the purpose of the present document, the abbreviations given in 3GPP TR 21.905 [1a] and the following apply:

RR connection: a RR connection is a dedicated physical circuit switched domain connection used by the two RR or RRC peer entities to support the upper layers' exchange of information flows.

PS signalling connection: is a peer to peer UMTS connection between MS and CN packet domain node.

GPRS: Packet Services for GSM and UMTS system.

The label **(A/Gb mode only):** indicates this section or paragraph applies only to GSM system. For multi system case this is determined by the current serving radio access network.

The label **(Iu mode only):** indicates this section or paragraph applies only to UMTS system. For multi system case this is determined by the current serving radio access network.

The label **(S1 mode only):** indicates this section or paragraph applies only to Evolved Packet Core (EPC) and E-UTRAN access. For multi system case this is determined by the current serving radio access network.

In A/Gb mode,...: Indicates this paragraph applies only to GSM System. For multi system case this is determined by the current serving radio access network.

In Iu mode,...: Indicates this paragraph applies only to UMTS System. For multi system case this is determined by the current serving radio access network.

In S1 mode,...: Indicates this paragraph applies only to Evolved Packet Core and E-UTRAN access. For multi system case this is determined by the current serving radio access network.

In N1 mode: Indicates this paragraph applies only to 5G core network and NG-RAN access. For multi system case this is determined by the current serving radio access network.

SIM: Subscriber Identity Module (see 3GPP TS 42.017 [5c]). This specification makes no distinction between SIM and USIM.

MS: Mobile Station. This specification makes no distinction between MS and UE.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 24.301 [10] apply:

UE using EPS services with control plane CIoT EPS optimization

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2 Overview of Short Message Service (SMS) support

The purpose of the Short Message Service is to provide the means to transfer messages between a GSM PLMN Mobile Station (MS) and a Short Message Entity via a Service Centre, as described in 3GPP TS 23.040 [2]. The terms "MO" - Mobile Originating - and "MT" - Mobile Terminating - are used to indicate the direction in which the short message is sent.

The present document describes the procedures necessary to support the Short Message Service between the MS and the MSC or SGSN or MME or SMSF and vice versa, as described in 3GPP TS 23.040 [2].

The procedures are based on services provided by the Mobility Management sublayer as described in 3GPP TS 24.007 [4]/3GPP TS 24.008 [5] for CS in A/Gb mode and CS/PS services in Iu mode, 3GPP 24.301 [10] for CS/PS services in S1 mode, 3GPP TS 24.501 [15] for N1 mode and the Logical Link Control layer described in 3GPP TS 44.064 [6a] for GPRS services. For CS/PS service in S1 mode, depending on network configuration and UE subscription data, network may choose to use either packet-switched service or circuit-switched service to provide SMS

service. If circuit-switched service is used instead of packet-switched service, then the messages are tunneled through the MME. In this case the network also uses procedures described in 3GPP 29.118 [12].

2.1 Protocols and protocol architecture

In Iu mode only, integrity protected signalling (see 3GPP TS 24.008 [5], subclause 'Integrity Protection of Signalling Messages' and in general, see 3GPP TS 33.102 [5b]) is mandatory. In Iu mode only, all protocols shall use integrity protected signalling. Integrity protection of all SMS signalling messages is the responsibility of lower layers. It is the network which activates integrity protection. This is done using the security mode control procedure (3GPP TS 25.331 [5a]).

The hierarchical model in figure 2.1a shows the layer structure of the MSC and the MS in A/Gb mode. The hierarchical model in figure 2.1c shows the layer structure of the SGSN and the MS in Iu mode. The hierarchical model in figure 2.1d shows the layer structure of the MSC and the MS in S1 mode. The hierarchical model in figure 2.1e shows the layer structure of the MME and the MS in S1 mode.

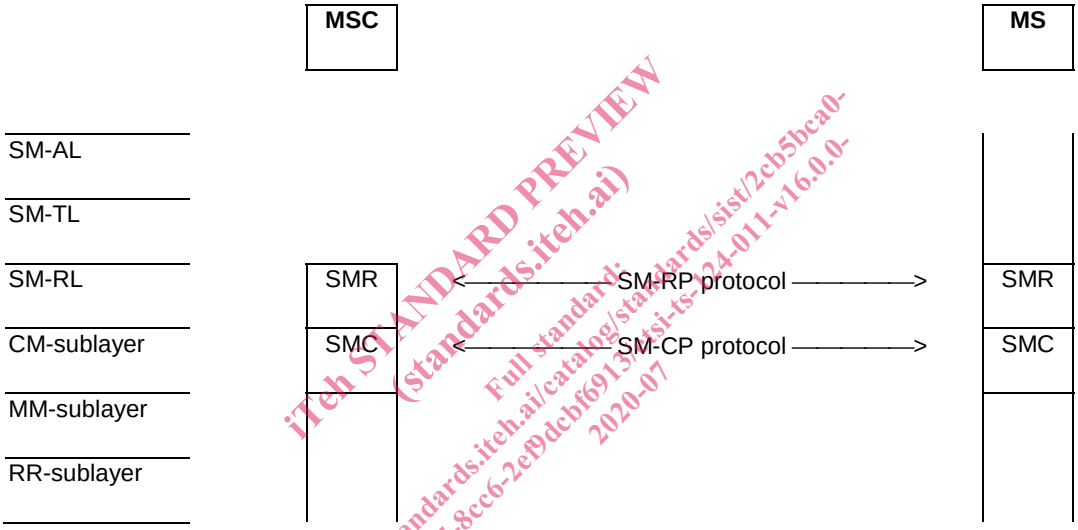

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Figure 2.1a/3GPP TS 24.011: Protocol hierarchy for circuit-switched service

The hierarchical model in figure 2.1b shows the layer structure of the SGSN and the MS in A/Gb mode.

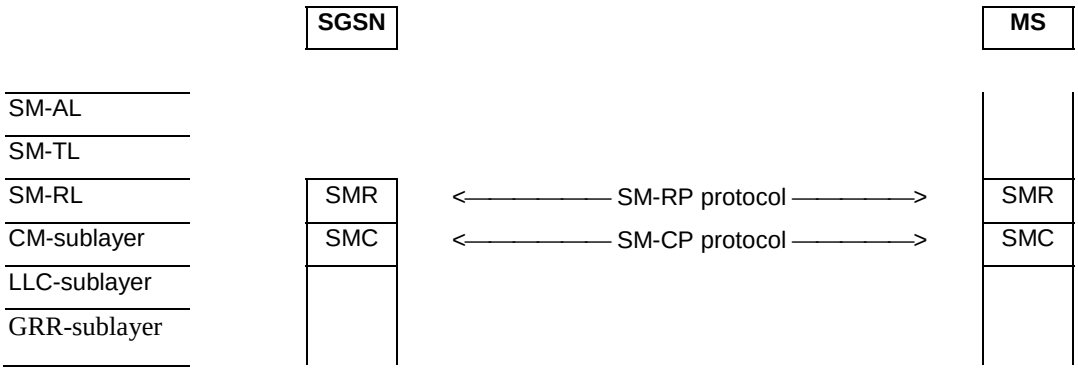


Figure 2.1b/3GPP TS 24.011: Protocol hierarchy for GPRS in A/Gb mode

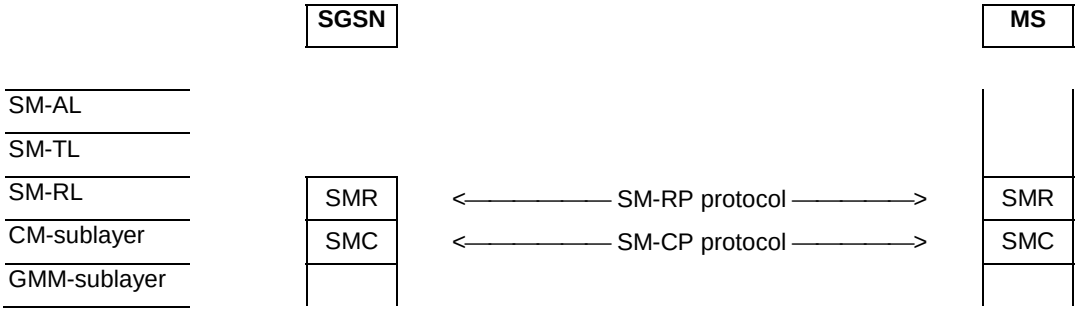
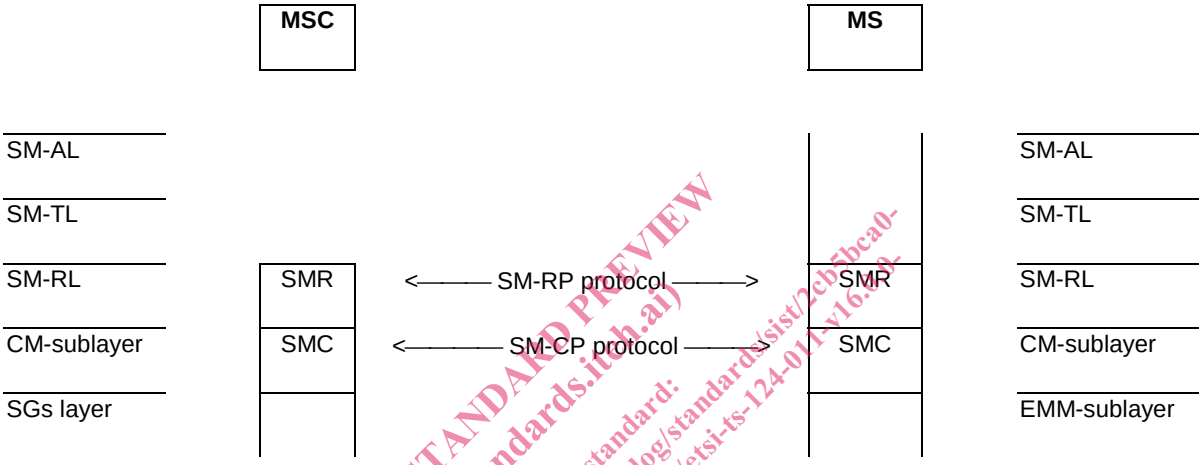


Figure 2.1c/3GPP TS 24.011: Protocol hierarchy for packet-switched service in Iu mode



NOTE: SM-CP messages are transferred between the MSC and the MS through the MME. The protocol stack on the MME is not shown.

Figure 2.1d/3GPP TS 24.011: Protocol hierarchy for circuit-switched service in S1 mode

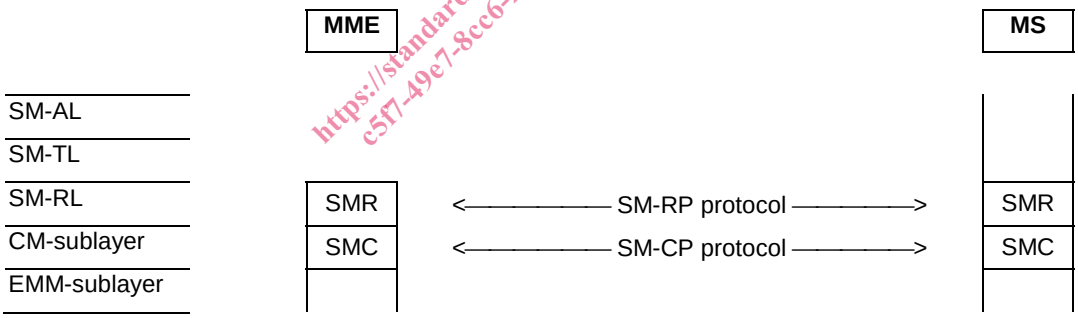


Figure 2.1e/3GPP TS 24.011: Protocol hierarchy for packet-switched service in S1 mode

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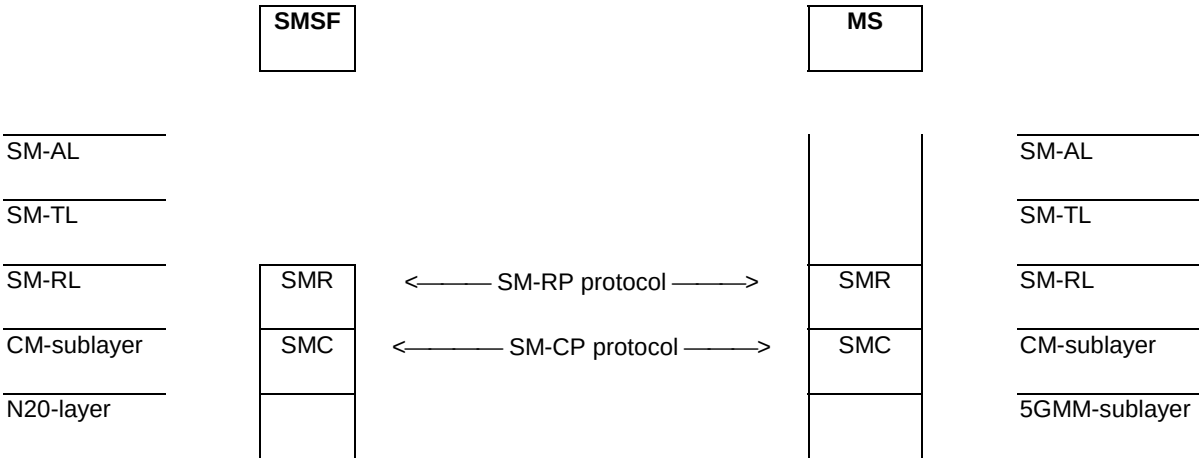

NOTE: SM-CP messages are transferred between the SMSF and the MS through the AMF. The protocol stack on the AMF is not shown.

Figure 2.1f/3GPP TS 24.011: Protocol hierarchy in N1 mode

The CM-sublayer, in terms of the Short Message Service Support, provides services to the Short Message Relay Layer.

On the MS-side the Short Message Relay Layer provides services to the Short Message Transfer Layer. The Short Message Relay Layer is the upper layer on the network side (MSC or SGSN or MME), and the SM-user information elements are mapped to TCAP/MAP.

The peer protocol between two SMC entities is denoted SM-CP, and between two SMR entities, SM-RP.

Abbreviations:

SM-AL	Short Message Application Layer
SM-TL	Short Message Transfer Layer
SM-RL	Short Message Relay Layer
SM-RP	Short Message Relay Protocol
SMR	Short Message Relay (entity)
CM-sub	Connection Management sublayer
SM-CP	Short Message Control Protocol
SMC	Short Message Control (entity)
MM-sub	Mobility Management sublayer
GMM-sub	GPRS Mobility Management sublayer
RR-sub	Radio Resource Management sublayer
LLC-sub	Logical Link Control sublayer
GRR-sub	GPRS Radio Resource sublayer in GSM
EMM-sub	EPS Mobility Management sublayer
5GMM-sub	5G Mobility Management sublayer

2.2 Use of channels (A/Gb mode only)

Table 2.1/3GPP TS 24.011 summarizes the use of channels for the short message service for circuit switched in A/Gb mode. Arrows indicate changes of channel.

Table 2.1/3GPP TS 24.011: Channels used for short message transfer over circuit switched in A/Gb mode

Channel dependency	Channel used
TCH not allocated	SDCCH
TCH not allocated -> TCH allocated	SDCCH -> SACCH
TCH allocated	SACCH
TCH allocated -> TCH not allocated	SACCH -> SACCH opt. SDCCH[3]

The short message service for GPRS shall be supported by a PDTCH.

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