

12 SMS

Objectives

After this chapter the student will:

- be able to define different types of SMS.
- be able to describe new functions in a GSM-network which supports SMS.
- be able to follow a SM from SMS-C to terminating MS.

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12.1 Introduction

Short Messages Services (SMS) are character based and can be used in GSM for sending and receiving text messages. There are three Short Messages Services defined for GSM:

- Short message MO/PP (Mobile Originated / Point-to-Point)
- Short message MT/PP (Mobile Terminated / Point-to-Point)
- Short message CB (Cell Broadcast)

MO/PP or MT/PP service allows for an acknowledged exchange of a short message (SM) between an MS and an SMS-Centre (SMS-C). The user information carried in the SM could be used by other applications than text. The exchange of messages between two MSs is only possible via the SMS-C. The CB service allows the operator to broadcast messages, e.g. weather reports, to all MSs in idle mode on a cell basis.

12.2 SMS Point-to-Point

The user service of delivering an SM from one MS to another is divided into two services and involves an SMS-C.

- Short message MO/PP denotes the capability of the GSM system to transfer a short message submitted from an MS to the SMS-C and to report a result (acknowledgement or error) about the delivery back to the MS.
- Short message MT/PP denotes the capability of the GSM system to transfer a short message delivered from an SMS-C to one MS and to report a result (acknowledgement or error) about the delivery back to the SMS-C.

The SMS-C is the node that the SMs are submitted to, stored in and delivered from. The short messages are sent to the SMS-C from e.g. an MS, e-mail or data terminal. Each SM is time stamped by the SMS-C when submitted and this timestamp will accompany the SM to the recipient. The SMS-C also makes it possible to send a receipt to the message originator when a message has been received at the other end. If the delivery attempt does not succeed, the SMS-C will be informed and the message stored. Depending on the network the SMS-C can be alerted to send the message again if the failure was due to unavailability or lack of memory in the MS. The notifications and messages are stored and will be deleted once the message is delivered or when a time limit has expired. The time limit is requested by the submitting MS but can be restricted by the operator. Values of the time limit range from 5 min. to 63 weeks.

Two complementary functions (or software packages) are needed, the SMS-Gateway MSC (SMS-GMSC) and the SMS-Interworking MSC (SMS-IWMSC). They will be integrated with an MSC or directly built into the SMS-C. The mobile terminating SMs are sent from the SMS-C to the network through an SMS-GMSC. The purpose of SMS-GMSC is to interrogate the HLR to find the address to the MSC where the MS is located. A mobile originating SM will be sent to the SMS-IWMSC where it will be routed from the MSC to the receiving SMS-C.

An SM contains up to 140 octets of user data. The text messages are produced with a predefined alphabet. The default SMS alphabet consists of 128 characters, each consisting of 7 bits. One SM can hereby contain a maximum of 160 characters. This is the normal text version. There is also a possibility to use the information for other applications than text. The default alphabet is complemented with a new alphabet, the “Universal Multiple Octet Coded Character Set 2”, UCS2. The characters are then coded with 16 bits, which means that a SM can carry 70 UCS2.

The MS should be able to receive and submit an SM both in “idle” mode, using SDCCH, and “busy” mode, using SACCH. Note that the SMS can be handled even though there is a call going on. The MS should also be capable of using the MO and MT services at the same time, i.e. receive and submit short messages simultaneously. Of the Supplementary Services defined in GSM only the barring services may be used in combination with the Short Message Service.

12.3 SMS Cell Broadcast

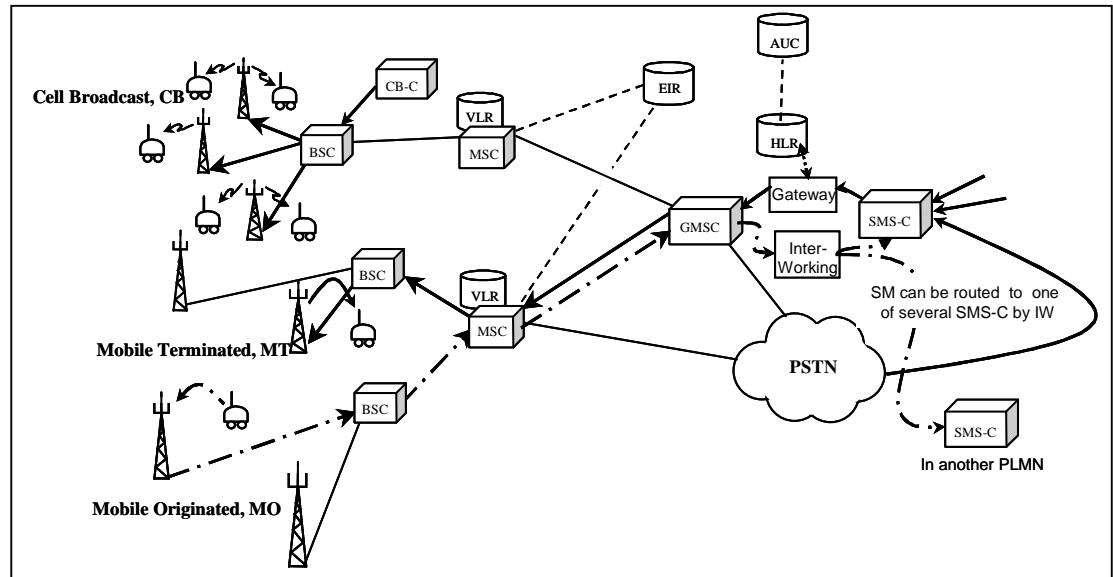
Short message CB denotes the capability of the GSM system to transfer a short message submitted from the operator to all idle mobile stations in a given geographical area on a cell basis. There is no acknowledging message sent back to the system about the delivery. The CB short message contains a maximum of 93 alphanumeric characters from the default alphabet. This can be used for advertising or reserved for messages like traffic information and weather reports.

One important difference between CB and the other types of SMS is that the CB message is loaded from a Cell Broadcast Centre to the BSC. CB-Centre is considered to be a node outside the PLMN and can be connected to several BSCs. The messages sent from the Cell Broadcast Centre may originate from different sources called Cell Broadcast Entities. The coverage areas will be assigned by agreement between the service provider and the network operator.

The message will be distributed from the BSC to the BTSs of the area to be covered. The message is sent on the CB Channel (CBCH) which uses

the SDCCH, sub-channel no. 2, and can there be monitored by all MSs in idle mode.

Up to 15 of these messages (with 93 characters) may be concatenated to form a macromessage. Each page of such a macromessage will have the same message identifier, (indicating the source of the message), and the same serial number. Using this information the MS is able to identify and ignore rebroadcasts of already received messages.



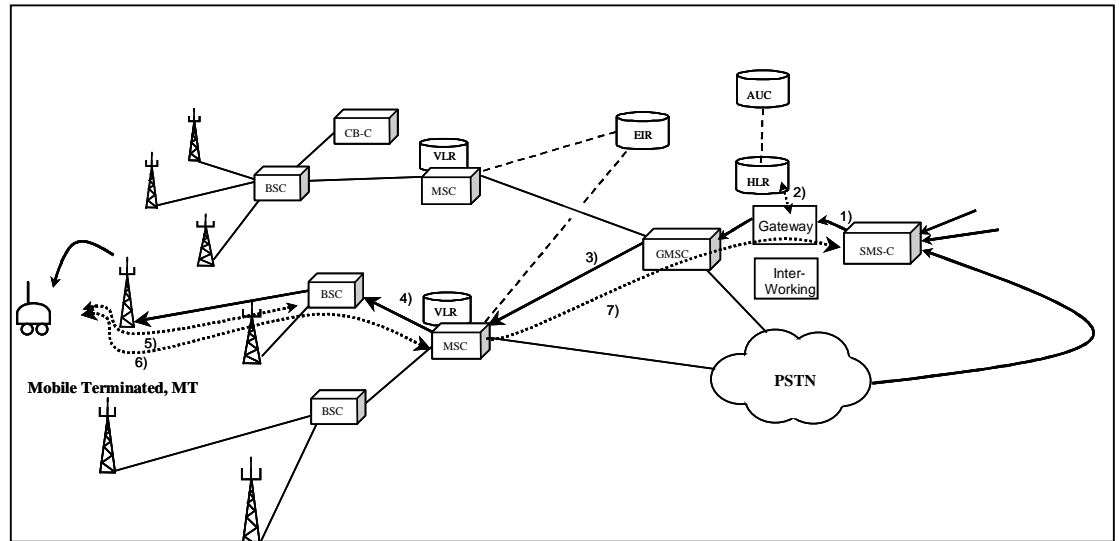
Short Message Services

12.4 SMS Mobile Originated/PP

The MS generates an SM which contains the telephone number to the receiving MS. The "telephone number" of the SMS-C will be added as destination address. Now the MS will establish a signalling link and sends the message via a specific protocol to the MSC. Assuming that this MSC is an Interworking-MSC the SM will be sent in a signalling message to the SMS-C. Confirmation to the MS is sent back the same way. Now the SMS-C can start the MT service.

12.5 SMS Mobile Terminated/PP

The MT/PP is initiated when the SMS-C is reached by a SM. How the message reaches SMS-C is out of scope of the GSM specification except when it is sent from a GSM MS. Other entities, e.g. email, data terminals, mailbox systems etc. could be used.



SMS mobile terminated point-to-point transfer

- 1) The SM, with added information of original sender and a timestamp, is conveyed to the SMS-GMSC that hosts the subscriber.
- 2) The SMS-GMSC interrogates the HLR for routing information. The HLR checks the database to find out whether the MSISDN is known and that the MS has an SMS subscription.

If the service is not barred, the MS must be reachable and have enough storage memory. Flags in HLR may set the availability and memory information. The HLR then returns the routing information (IMSI and routing address for the MSC/VLR).

If it isn't possible to deliver the SM a rejection message, with error cause, will be sent to the SMS-C. In that case the SMS-C will store the information for a limited period of time. The limit is requested by the originator but can be restricted by the operator. The SM can be sent if the SMS-C is alerted within this time period.

The routing information does not need to include a MSRN because the SM will use signalling channels to be transported to the visited MSC.

- 3) The SMS-GMSC reroutes the SM to the MSC/VLR, which serves the MS for the moment.
- 4) The MSC checks in the VLR if the MS is attached or not and if the MS is busy for other SMS. If the MS has capability for SMS handling and is attached to the system, a paging message will be sent to the MS.
- 5) The MS sends a channel request and receives an SDCCH and an SACCH in the same way as for an ordinary call set-up.
- 6) The MS will send a "Paging Response" to MSC/VLR. It is then up to the MSC to choose what security procedures to perform, e.g. authentication, ciphering etc. On the positive outcome from the security procedures the SM will be transmitted to the MS, still on the SDCCH. The MS will acknowledge after reception of the whole SM.
- 7) If the delivery was successful a delivery report is sent from MSC/VLR to the SMS-C. An unsuccessful delivery result in a failure report sent to SMS-C.

In case of unsuccessful delivery due to unavailability, the VLR sets a flag indicating that there is a message to be delivered to the MS. Optionally the HLR also stores information about unsuccessful deliveries. The HLR will then also hold a list of addresses to those SMS-C which have made unsuccessful delivery attempts. If the reason for the unsuccessful delivery then cease to exist the HLR can alert these SMS-C which can re-start the SMS MT.