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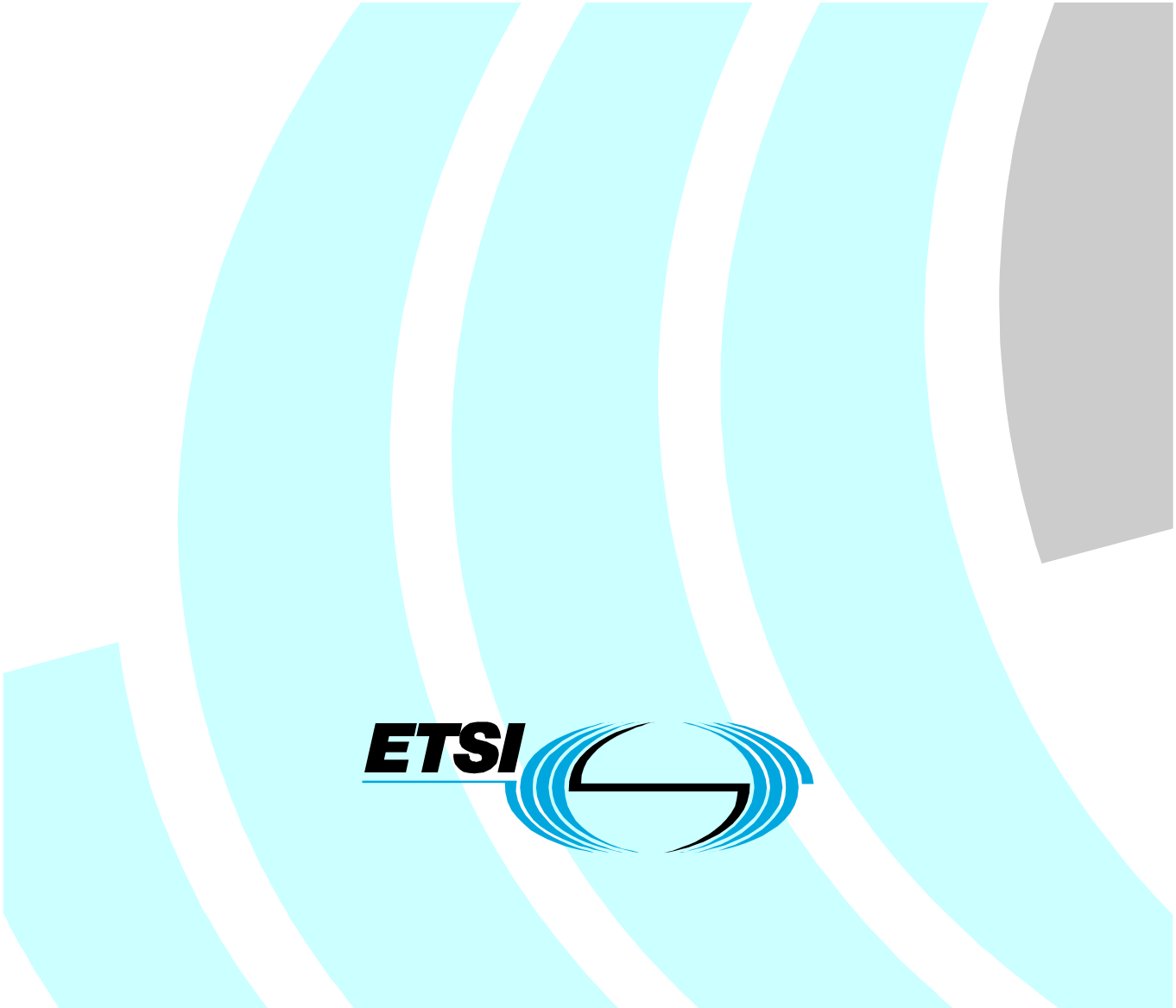
Technical Report

Analysis of the Short Message Service (SMS) and Cell Broadcast Service (CBS) for Emergency Messaging applications; Emergency Messaging; SMS and CBS



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Foreword

This Technical Report (TR) has been produced by ETSI Special Committee Emergency Communications (EMTEL).

Introduction

The present document provides an overview of the functionality of the Short Message Service (SMS) and the Cell Broadcast Service (CBS) and considers the relevance of certain service characteristics and certain specific functions of either service to the use of SMS and CBS for Emergency messaging applications. The TR does not set out to make comparisons between SMS and CBS, neither does its scope extend to making any recommendation for the selection of either SMS or CBS compared to other technologies.

The definitive specifications for SMS and CBS are TS 123 040 [1] and TS 123 041 [2] respectively. The present document merely provides an interpretation of those definitive specifications. In any doubt, the definitive specifications must be consulted.

SMS and CBS are just 2 possible mechanisms that may satisfy requirements for Emergency Messaging Services.

TR 102 182 [5] and TR 103 180 [6] contain additional information concerning a study for SMS and CBS for Emergency Messaging applications. Some of that information is independently mentioned in the present document. There is in general, consistency of information across all documents but each document elaborates the subject matter appropriate to itself.

In the present document, considerations for SMS are primarily aimed at its use for Subscriber (citizen) initiated emergency messages (request for assistance) whereas considerations for CBS are primarily aimed at its use for Authority initiated broadcast emergency messages (e.g. national emergencies or local emergencies).

Whilst it is possible for SMS to be used for Authority initiated broadcast emergency messages certain criteria may limit the effectiveness of such a service. E.g. Difficulty in obtaining location information for specific MS's; SC or mobile network overload due to instantaneous demand to process large numbers of Short Messages which may result in delay or non delivery.

It should be recognized that originators and/or recipients of emergency messages may be disabled (e.g. deaf), elderly or children and that consideration for their particular needs when using SMS or CBS may be necessary SR 001 996 [9]. Such requirements are not specifically addressed in the present document. Provision of any special MMI or service provision for SMS and CBS are usually vendor or network operator specific.

It may become apparent from the body of the present document that changes / enhancements to 3GPP Technical Specifications would be desirable if SMS and /or CBS were to be used for emergency messaging. It should be noted that SMS is a mature service and that changes that risk backwards incompatibility would be unadvisable. CBS is by contrast not so widely used but similar concerns regarding changes to 3GPP CBS Technical Specifications may be raised as there are already some implementations.

1 Scope

The present document covers the analysis of SMS and CBS for Emergency Applications using mobile radio systems although TS 123 040 [1] makes provision for Short Messages to be originated or terminated at a suitably equipped fixed network termination.

2 References

For the purposes of this Technical Report (TR), the following references apply:

[1] ETSI TS 123 040: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Technical realization of Short Message Service (SMS) (3GPP TS 23.040 Release 6)".

[2] ETSI TS 123 041: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Technical realization of Cell Broadcast Service (CBS) (3GPP TS 23.041 Release 6)".

[3] ETSI TS 123 038: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Alphabets and language-specific information (3GPP TS 23.038)".

[4] ETSI SR 002 180: "Requirements for communication of citizens with authorities/organizations in case of distress (emergency call handling)".

[5] ETSI TR 102 182: "Emergency Communications (EMTEL); Requirements for communications from authorities/organizations to the citizens during emergencies".

[6] ETSI TR 103 180: "Access and Terminals (AT); Study on Emergency Communications; Aspects related to fixed line terminals", annex B.

[7] ETSI TR 121 905: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Vocabulary for 3GPP Specifications (3GPP TR 21.905)".

[8] ISO/IEC 10646: "Information technology; Universal Multiple-Octet Coded Character Set (UCS)".

[9] ETSI SR 001 996: "Human Factors (HF); An annotated bibliography of documents dealing with Human Factors and disability".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Mobile Station (MS): in the present document it is synonymous with the term "user equipment" (UE) in UMTS terminology as defined in TR 121 905 [7]

Public Safety Answering Point (PSAP): physical location where emergency calls are received under the responsibility of a public authority (see Commission Recommendation C (2003)2657)

3.2 Abbreviations

For the purposes of the present document, the following abbreviations given in TR 121 905 [7] and the following apply:

3GPP	Third Generation Partnership Project
BSC	Base Station Controller
BTS	Base Transmitting Station
CBS	Cell Broadcast Service
DCS	Data Coding Scheme (see TS 123 028 [3])
DRX	Discontinuous Reception (see TS 123 041 [2])
EMS	Enhanced Message Service
EMTEL	EMergency TELecommunications
GSM	General System for Mobile communication
HLR	Home Location Register
MMI	Man Machine Interface
MMS	Multimedia Message Service
MO-SM	Mobile Originated-Short Message
MS	Mobile Station (see clause 3.1)
MT-SM	Mobile Terminated-Short Message
PID	Protocol IDentifier (see TS 123 040 [1])
PLMN	Public Land Mobile Network
PSAP	Public Safety Answering Point (see clause 3.1)
QoS	Quality of Service
SC	Service Centre
SIM	Subscriber Identity Module
SMS	Short Message Service
SMS-SC	Short Message Service-Service Centre (as SC above)
UE	User Equipment (see clause 3.1)
UMTS	Universal Mobile Telecommunication Service
URL	Universal Resource Locator
USIM	Universal Subscriber Identity Module
VLR	Visited Location Register

4 Short Message Service

The Short Message Service is defined in TS 123 040 [1].

The Short Message Service allows Text or Binary messages to be sent to and from an MS via a Short Message Service Centre (SC) that is responsible for storing and forwarding Short Messages.

Text Message lengths are in units of 160 characters (seven bit coding, see TS 123 038 [3]). Binary Message lengths are in units of 140 octets. Concatenation allows units to be strung together to allow longer messages to be sent.

The SMS specifications also define the Enhanced Messaging Service (EMS) that allows simple line graphics, simple animations and polyphonic sounds to be contained within a Short Message.

For ease of writing, all references to SMS in the present document shall be taken to include EMS unless specifically commented otherwise.

Some key points regarding SMS are as follows:

- Store and Forward Service - virtually guarantees message delivery once message has been sent to and received by the SC. Many performance issues (e.g. delivery times) are network operator specific. Some network operators use routers to deliver the Short Message to its final destination without the need for a Store and Forward function and in the event of non delivery the Short message may be subsequently stored or deleted.
- Not ideal for 2 way messaging applications where real time messaging is a criterion.
- Problem of non delivery or delayed delivery usually due to recipients MS being in poor radio coverage.
- Reliable - but has characteristics that may give impression of unreliability, i.e. message delay.

- Message integrity virtually 100 %.
- Deployed in virtually every GSM PLMN and by implemented in virtually every MS. Over a decade of wide commercial service. Its deployment and support in UMTS environments is low compared to GSM.
- Will often succeed in poor radio conditions where voice calls do not, due to air occupancy for a Short Message being only a few tens of ms, compared to a considerably longer period for speech.
- Will often succeed in conditions of voice congestion in the network because SMS uses signalling radio channels and not speech radio channels.
- Biggest revenue earner next to speech. Network operators keen to identify increased revenue opportunities.
- Can only target specific MS's and so its suitability to reach large numbers of MS's in a reasonable time frame is limited.
- Service execution of an MO-SM is done in the home PLMN.

4.1 Functional overview

A mobile subscriber compiling a short message for sending is normally required, as a minimum, to enter the message content and a destination address (i.e. the intended recipients address) which can be another MS, a short code or a fixed data network address. There are other parameters that are either inserted automatically by the MS or may be selected as options by the mobile subscriber. Some of these are discussed later.

A Mobile Originated Short Message (MO-SM) is normally routed to the subscriber's home network SC. The address of that SC is held on the (U)SIM in the MS and automatically inserted by the MS when the Short Message is sent. The sending MS number is also automatically inserted by the MS and cannot easily be altered by the subscriber. Once the Short Message has been received by the SC, the SC sends an acknowledgement to the sending MS, sometimes displayed as "Message Sent" on some MMS's. "Message Sent" means that the Short Message has only been received by the SC, **NOT** by the intended recipient. This is often misunderstood by persons sending Short Messages.

The SC then secures the Short Message and begins to make an attempt to deliver it to the intended recipient.

If the intended recipient MS or receiving apparatus is available then the Short Message is delivered.

If the intended recipient MS or receiving apparatus is not available or there are network problems on the delivery side then the SC delivery attempt will fail and the SC will then usually enter a retry schedule according to the error condition that has been encountered. Whether delivery of that particular Short Message succeeds depends on a number of factors. One important factor is a parameter called the Validity Period, and is usually set to a default by the sending MS which defines the time period for which a particular Short Message is to be held in the SC pending delivery. If the Short Message cannot be delivered within the Validity Period because of a prevailing error condition then it is usually automatically deleted by the SC.

Once a Short Message has been successfully delivered, the receiving MS or receiving apparatus sends an Acknowledgement to the SC. Such an acknowledgement does not mean that the Short Message has been read.

This usually completes the sequence involved with the sending and receiving of a Short Message.

The sender of the Short Message can, however, set a request for "Delivery Confirmation" as an optional parameter when compiling the Short Message. The Delivery Confirmation causes the SC to inform the sending MS that the Short Message was successfully delivered to the recipient MS or receiving apparatus.

It was earlier stated that a MO-SM is normally sent to the MO subscriber's home network SC. It is technically possible for the recipient of an MT-SM to send a reply via the originators SC that is on a different network. This functionality is known as Reply Path (see TS 123 040 [1]). However, not all Plan's or Sac's support this functionality and so there is a risk that where this feature is used by one network and not by the other the reply Short Message may never reach its destination.

4.2 Service characteristics

4.2.1 Alert SC

The Alert SC functionality allows the radio network to automatically trigger the SC to deliver a pending Short Message if the receiving MS becomes available having been previously unavailable (e.g. out of radio coverage or turned off). This functionality can pre-empt a retry schedule in the SC and hence expedite an earlier delivery of a Short Message. All PLMN's and SC's should support Alert SC. The Alert SC mechanism is also invoked on location update (new cell), registration (MS being turned on) and by the periodic location update timer in the MS.

4.2.2 Retry schedules

The need for an SC to provide Retry schedules and the schedule details are outside the scope of 3GPP specifications. However, most SC's provide a retry schedule mechanism but the timing periods and the error conditions to which various retry schedules relate are network operator specific. This can give rise to inconsistent perception of performance between different networks. In some SC's certain error conditions will result in immediate message deletion and hence it will never get delivered. Many SC's will make a re attempt within 1 minute of the initial attempt failing but this should not be relied upon.

4.2.3 Concatenation

Although the basic unit of a text Short Message is 160 characters, it is possible to send longer messages by stringing a number of Short Messages together - a process known as concatenation. It is not good practise to concatenate more than a few (up to 5) Short Messages. The reason for this is that the concatenation mechanism is unsophisticated and provides no means of requesting missing message segment units. Individual message segment units may not arrive in sequence, they may get lost or there may be no implementation in some MS's to treat them as a continuous message or have the ability to store them. Those risks become greater the more segment units that are sent. Concatenation is an option and may not be supported by all MS's. Its use therefore for emergency Short Messages is questionable.

4.2.4 Message duplication

Short Message duplication, although rare, can occur and is usually the result of the sending or receiving MS being in a poor radio environment. In the case of a mobile originated Short Message, it is possible for the Short Message to reach the SC but the acknowledgement to be lost. The sending MS has the capability to automatically resend the message or the user may resend the message because they have not received a "Message Sent" indication. There is therefore a risk that the SC will have duplicated Short Messages and although re-sent messages should automatically include a protocol reference that is unchanged between messages there is no guarantee that this is so or that the SC will ignore a duplicate Short Message. In consequence, the SC will treat the re-sent message as just another Short Message.

In the case of a mobile terminated short message, it is possible for the short message to reach the receiving MS but the acknowledgement to the SC to be lost. The SC will therefore attempt to deliver the same Short Message again.

The implications of duplicate Short Messages for emergency applications need careful operational consideration.

4.2.5 Priority messages

There is no standardized mechanism for a mobile originated Short Message to be assigned as a "Priority Message". Were such a parameter to be defined in the SMS 3GPP specification but its use would need to be carefully controlled otherwise normal users would choose to use the function if they were to achieve any benefit such as priority handling.

In order to be of any benefit for emergency use, a priority Short Message may need to be handled in preference to other Short Messages at the Radio Interface and in situations of radio path congestion. This is a highly complex change to make to 3GPP Technical Specifications.

However, a limited form of priority handling may be possible without the need for 3GPP Technical Specification changes. Such a mechanism could be restricted to the routing and handling of priority Short Messages once they had been received at the SC. For a mobile originated emergency Short Message it would be possible for the network and other infrastructure platforms such as the SC to treat a Short Message with a Destination Address of 112/999 as a priority (see clause 4.2.6). Were any priority mechanism to be defined then special provision in network elements such as the BSC, VLR, HLR and SC may be required to handle priority/emergency Short Messages.

Provision is made in current TS 123 040 [1] to assign a priority to mobile terminated Short Messages but this functionality is concerned with PLMN infrastructure functionality and is not visible to the radio interface or indicated to the receiving MS.

4.2.6 Short codes

A sender of a Short Message usually enters the telephone number of the MS to which the short message is to be delivered. Network operators provide terminating services that are not mobile phones and such services often have short codes e.g. 1234. Many of these short codes are home network operator specific. National emergency numbers such as 112/999 are already defined by the national regulatory authority for voice emergency calls. Use of short codes 112/999 are therefore obvious candidates for Mobile Originated Emergency Short Messages but would need multi lateral agreement between network operators to support them in mobile networks and in the SC (see clause 4.3.4).

4.2.7 Smart cards (SIM/USIM)

There is no current capability for SMS to be sent without both a smart card and a valid subscription.

4.2.8 Man machine interface

3GPP Technical Specifications avoid defining MMI aspects as they are left to vendors to allow them to differentiate their products from their competitors. It is likely that mobile vendors would want to provide an MMI that gives mobile subscribers an easy menu selection for sending emergency Short Messages which could include a predefined text string and perhaps an automated delivery confirmation request.

4.2.9 Roaming

Mobile Originated Short Messages are normally sent to an SC in the subscriber's home network irrespective of where in the world the mobile subscriber happens to be. The address of that SC is held on the mobile subscribers (U)SIM. Alternative SC addresses belonging to other network operators may be entered by the mobile subscriber but unless there is an agreement for that SC to handle messages from subscribers to other networks, then that the Short Message will probably be rejected by the SC. The issue for Emergency services is that a subscriber temporarily in a country other than their home country and requiring local emergency assistance by sending a Short Message would require that subscribers home network operator SC having to route the emergency Short Message to a PSAP local to the subscriber. The SC itself has no knowledge of the location of the subscriber although such information which may merely be the subscriber's current temporary country could be extracted by the network operator from other network infrastructure elements. To route the Short Message (or its content) to a PSAP local to the subscriber requires functionality that does not currently exist.

It is not possible for a Short Message to be sent between different PLMNs unless a roaming agreement exists.

4.2.10 Viruses

SMS does not require any executable environment within the MS for normal text message display. The risk of a virus being transmitted by SMS text messages is therefore low to non existent. However, a text message may contain a URL to a site that could be the source of a virus problem and if the MS provides the capability to action a URL contained in a Short Message then the risk of virus infection could be greatly increased.

4.2.11 Spam

Spam is an ever increasing problem for SMS and generally arises from poorly controlled access to SC's or lack of billing. Tarifing has been a significant controlling factor in keeping SMS spam instances low but "free SMS" has encouraged its increase. The originating address of a Short Message can be seen by the recipient and for mobile originated Short Messages this is the address of the MS that sent the Short Message and is therefore traceable through a network operator. There are a number of rogue MS's appearing on the market that may use SC's that do not exercise control over the sender. There are also a number of SC's that provide internet connectivity and therefore allow the internet spam culture to penetrate into the SMS environment with little or no traceability of the source of the short message.

4.2.12 Malicious emergency Short Messages

For mobile originated emergency Short Messages it is likely that the problems and instances will be similar to those already experienced for Voice emergency calls.

For mobile terminated national emergency messages it would be possible for spam either from a mobile phone or from the Internet to create malicious emergency messages and cause a panic reaction for many mobile subscribers. Such abuse is possible today and although tracing the origins of Short Messages is inherent in most SC's, providing evidence of such Short Messages is difficult as content is not generally stored in SC call data records.

Mechanisms for the receiving apparatus to authenticate the source of the emergency message may need to be developed. Many recipients may not know how or may not bother to authenticate an Emergency Short message and react to the message content without delay.

4.2.13 Charging

Most network operators SC provides SMS data call records that are sent internally to a charging function that generates the appropriate bills. Data Call records usually contain at least Date and Time of the Short Message, Originators and Recipients addresses. SCs in general, have no concept of charging. The charging function can usually assign zero tariffs to certain Short Messages and could therefore assign a zero tariff to mobile originated Short Messages sent to a defined emergency number.

Most network operators have no mechanism to charge the recipient of a Short Message when roaming.

4.2.14 Fixed Network Connectivity

It is possible for Short Messages to be sent from a MS to a fixed network entity such as the internet or from a fixed network entity to a MS. However the provisioning of fixed network connectivity to the SC is outside the scope of the 3GPP specifications and is network operator specific. This is a significant problem for PSAPs that need to be connected to SCs belonging to different PLMN operators in that numerous physical, transport and application layer protocols would need to be catered for by the PSAP. One possible solution would be for every PLMN operator to provide connectivity to a PSAP web site.

4.2.15 Prepay mobile phones

Although it has been possible for many years for prepay phones to be able to make voice calls to emergency services, even though the phone may be out of credit, the concept of this functionality to SMS is as yet, undeveloped. PLMN operators would therefore need to implement such functionality.

4.2.16 Performance

Most users perception of SMS performance is that resulting from MS to MS short messaging, where the main reason for non delivery on the first attempt from the SC, is the non availability of the receiving MS. Often such experiences can be poor - (e.g. extreme delivery delays), but in the majority of cases, these are due to the recipient's mobile being in poor radio coverage or turned off. For two way Short Message applications between MS's, the problems can be greatly exacerbated. Mobile originated to fixed network terminated Short Messages however, can exhibit near real time performance - typically 98 % of messages being delivered within a few s. Clearly a fixed network originated to mobile terminated Short Messages will exhibit similar characteristics to that of MS to MS Short Messaging with some small degree of improvement due to the sending entity not being a radio device.

A simple practical test to simulate a mobile originated to fixed network terminated service performance is to time the period between sending a Short Message and receiving the "Message Sent" indication that indicates that the Short Message has been received by the SC. Usually this should be no more than 5 s. Ongoing delays for Short Message content sent between the SC and the fixed network entity are usually minimal as they are normally high speed and high availability data networks.

Typical expected performance figures for SMS are as follows:

- If delivery time is crucial e.g. "Delivery Confirmation" not received in 15 s then use of a non SMS back up system may be essential. General mobile network problems can affect both SMS and speech traffic.
- The time between Short Message sending from an MS to Short Message received at recipient MS should be typically 6 to 8 s. Only about 1 s to 2 s typically of this is attributed to message storage in the SMS-SC.
- The time between sending a Short Message from an MS to that MS receiving "Delivery Confirmation" should be typically 10 s to 12 s.
- Typically 38 % of Short Messages are not delivered on first attempt. This is mainly due to the receiving MS being out of coverage, poor coverage or turned off.
- Typically 98 % of messages are actually delivered eventually. Some network operators have given figures of about 98 % delivery success within 5 s of all Short Messages sent from a MS to a fixed network.

4.2.17 Location information

SMS in itself provides no location information. Such information may be obtained by secondary means such as an agreement with the network operator for cell location (see clause 4.2.18).

SMS makes little provision for messages in any specific language. However, it does make provision for different character sets and so for example it is possible for messages to be written or displayed in Arabic characters. Almost all character sets are catered for in UCS2 coding (see references [3] and [8]) which can limit the length of a Short Message to 70 characters (longer with concatenation). It would appear that proprietary implementations of the use of certain character sets e.g. Hungarian which may be catered for in TS 123 038 [3] by escape mechanisms may result in simple messages that exceed the capacity of one Short Message.

For mobile originated SMS emergency messages it would be the responsibility of the PSAP to have the capability of understanding the various character sets and indeed the language of the content of an emergency short message.

4.3 Specific functions

SMS provides the subscriber with a number of specific functions and indications that may be optionally selected, either by the originator of a Short Message, or by the SC.

4.3.1 Delivery confirmation

The sender of a Short Message may, as an option, request a "Delivery Confirmation" at the time the Short Message is sent. The sender of the Short Message will receive a Delivery Confirmation indication when the Short Message has reached its intended recipient. There is no indication that the Short Message has not reached its intended recipient other than the absence of a Delivery confirmation Indication. Therefore, if a Delivery Confirmation Indication is not received within an expected time period (see clause 4.2) then the sender may wish to take some other form of action. Sending the same Short Message again may not necessarily resolve the problem, as the receiving MS may be out of radio coverage or turned off. Delivery Confirmation, even though it may be available in the MS, may not be supported by all networks. It should be noted that Delivery Confirmation does not mean that the Short Message has been read by the recipient but merely that the recipient's apparatus has actually received the Short Message.

It should be noted here that as mentioned in clause 4.1, an indication of "Message Sent" displayed on many MS's after sending a Short Message is often misunderstood to be "Delivery Confirmation".

4.3.2 Display immediate

Most receiving MS's have the capability of displaying a received Short Message immediately rather than just storing it in the phone memory or on the (U)SIM. The received Short Message contains a parameter (Data Coding Scheme - Message Class 0 - Display Immediate TS 123 038 [3]) that is normally set by the sender of the Short Message or the SC to instruct the receiving MS whether to display the message immediately. It is possible in many MS's for the mobile user to set personal preferences in the MS to disable the immediate display of Short Messages. In the case of a mobile terminated emergency message, the MS may require functionality to over -ride the MS user preference setting. It may therefore be necessary for the MS to have some mechanism to identify a mobile terminated emergency Short Message (see clause 4.3.4).

4.3.3 Validity Period

Validity Period is usually set as a default by the sending MS which defines the time period for which a particular Short Message is to be held in the SC pending delivery. If the Short Message cannot be delivered within the Validity Period because of a prevailing error condition then it is usually automatically deleted by the SC.

4.3.4 Identification of emergency Short Messages

There is no provision currently in TS 123 040 [1] to identify an emergency Short message either in the MO-SM case or the MT-SM case. The PID function element defined in TS 123 040 [1] is a possible candidate to convey such identification but this would require specific functionality in the MS to set the PID value and/or to decode it. The PID is used for many functions all of which are mutually exclusive and so in the case of its use to identify emergency Short Messages it's other uses would not be possible concurrently.

The DCS function element defined in TS 123 038 [3] is another possible candidate. It has the advantage of its functions not being mutually exclusive but apart from message classes/types, its prime function is for language / alphabet identification.

The PLMN does not normally have any access to either the PID or DCS and so their use for routing / identification within the PLMN would require a significant change. Both the PID and DCS are accessed by the SC.

For the MO-SM emergency message case it would seem that the Destination address (e.g. short code 112/999) would be the most viable means of identification for PLMN and SC routing purposes.

For the MT-SM emergency message case the Originating address could be set to a specific address generally recognized as an emergency address (e.g. short code 112/999) but again, specific functionality would be required in the receiving MS to specifically process such a message.

4.3.5 Reply path

In clause 4.1, the Reply Path functionality was briefly explained. In the case where 2 way emergency messaging requires MO-SM's to be routed back to a particular SC for onward routing of its content to a PSAP then that functionality cannot be guaranteed to work in cases where the recipients MS is on a different PLNM to that of the sending entity of the Short Message.

5 Cell Broadcast Service

The Cell Broadcast Service (CBS) is defined in TS 123 041 [2].

The Cell Broadcast Service allows text messages to be broadcast to all MS's in a given country, all MS's in a selected group of geographical locations, or all MS's in a particular cell area.

Text messages may be up to 93 characters long.

Text messages may be repeatedly broadcast periodically by the GSM BSC/BTS within the range 2 s to 32 minutes. In a UMTS environment, the highest repetition rate is 1 s.

Some key points regarding CBS are as follows:

- A unique service which is capable of indiscriminately targeting large numbers of mobiles virtually instantaneously.
- It requires no protocol acknowledgement from the mobile.
- The Mobile MMI has to be set up to selectively display any desired broadcast information.
- CBS Text Messages are sent on a dedicated broadcast channel that makes it less liable to problems of congestion.
- CBS has been deployed on relatively few GSM PLMN's. Difficulty in business case justification has been a significant factor for its low penetration. Problems with high power drain in MS's and difficulty in providing a user friendly MMI have limited MS development. National legislation or financial incentive may be necessary before mobile network operators provide support for CBS Emergency Messaging. Its deployment in UMTS environments is significantly less than for GSM.

5.1 Functional overview

CBS text messages are downloaded to the BTS/BSC either specifically under the control of the network operator or via a Cell Broadcast Service Centre (CBC) to which commercial services would normally be connected. Once downloaded to the BTS/BSC, it is the responsibility of the BTS/BSC to repeat the broadcast at the required period. Messages held in the BTS/BSC may be updated at any time so as to provide more recent information.

Once the Cell Broadcast reception facility is enabled in the MS, the mobile phone is capable of continuously receiving all Cell Broadcast subject matters (known as "message identifiers" - e.g. weather, road traffic, advertising, emergencies) but will only display or store those subject matters that the mobile subscriber has chosen to see. All other subject matters are received by the mobile phone but discarded.

5.2 Service limitations

5.2.1 Malicious emergency CBS Messages

Although it is not possible for a MS to send a CBS message directly to other MS's, there is a risk that poorly policed access control to CBC's or PLMN's could allow the download of malicious emergency CBS messages to the BTS/BSC. Strict control may be necessary to prevent malicious emergency messages being broadcast. Mechanisms for the receiving apparatus to authenticate the source of the emergency message may need to be developed. Many recipients may not know how or may not bother to authenticate an Emergency CBS message and react to the message content without delay.

5.2.2 MMI

A MS normally has to be specifically enabled by the subscriber to receive CBS messages. Once enabled, mobile manufacturer's report a considerable drain on battery life, although there are techniques in the specifications (DRX) to reduce this problem. Concerns have been raised by mobile manufacturers on the effectiveness of DRX, as any enabling of CBS, with or without DRX can reduce the "talk time" of their products, which is a key marketing differentiator. For this reason, MS's are normally shipped with the Cell Broadcast feature switched off.

5.2.3 CBS Message delays

Message reception may be delayed due to the receiving MS being in poor radio coverage. The receiving MS may also fail to process a received CBS message if it is engaged in a voice or data call.

However, as the normal use of CBS would be to repeatedly retransmit the message at pre-defined intervals then the MS has a reasonably high probability of receiving it eventually.

5.2.4 CBS Message cycle time

CBS has a finite capacity for broadcasting messages. Different commercial applications will require different cycle times for message repeats. If many applications require very short cycle times then it is likely that the expected QoS with regard to message repeats will not be met. Moreover, this could adversely impact on the cycle time for repeat Emergency CBS messages. Design considerations by implementers would need to be made to ensure that Emergency CBS messages receive the appropriate priority. Such matters lie outside the scope of 3GPP current specifications.

5.2.5 Spam

Spam is an ever present risk in any communications media. Uncontrolled access to PLMN's by irresponsible network operators could result in Spam CBS messages being sent. The impact on a subscriber could be that the MS gets into an overload situation that makes CBS unusable through too many messages being displayed.. The mobile subscriber does however have the capability to disable CBS messages having specific CBSmessage identifiers.

Spam may also cause the CBS air interface bandwidth to become overloaded resulting in Emergency CBS messages being severely delayed. Provision may therefore be required in the BTS/BSC to suspend the transmission / retransmission of other CBS messages when an emergency CBS message is present.

5.2.6 Viruses

CBS does not require any executable environment within the MS for normal text message display. The risk of a virus being transmitted by CBS messages is therefore low to non existent. However, a CBS message may contain a URL to a site that could be the source of a virus problem and if the MS provides the capability to action a URL contained in a CBS Message then the risk of virus infection could be greatly increased.

5.3 Specific functions

5.3.1 Display immediate

The received CBS message may contain a parameter contained in the DCS that it set by the sender of the CB or the CBC to instruct the receiving MS to display the message immediately. This is known as message class 0 (see TS 123 038 [3]).

The MMI on the MS needs to provide the ability for immediate display of broadcast emergency messages. Without this capability it is likely the recipient's MS would be incapable of rapidly distinguishing between an Emergency CBS message and CBS messages from other applications which may be numerous in number.

5.3.2 Language

CBS specifications allow for CBS messages to be sent in numerous languages. However, in the event of a national emergency, the CBC has no mechanism to select a particular language on a per subscriber basis. Emergency messages could however be sent out in a number of languages that are common in a particular country.

History

Document history		
V1.1.1	February 2006	Publication