SMS Access and SMS Bedrift

Whitepaper

Connection to the SMS Centre

VERSION 2.3, JUNE 2009

Contents

1 Abbreviations and terms

API	Application Programming Interface. A collection of routines/functions that software applications use to carry out various operations.
ASCII	American Standard Code for Information Interchange – character set.
CPA	Content Provider Access. Middleware for handling content billing for service providers.
CLI	Calling Line Identity.
Default Alphabet	Seven-bit character set for GSM, defined by ETSI.
EMI	External Machine Interface – proprietary application protocol for ESME.
EMS	Enhanced Messaging Service.
ESME	External Short Message Entity.
	SMPP terminology for an LA.
ETSI	European Telecommunications Standardisation Institute – owner and publisher of GSM standards.
FIFO	First In First Out.
IETF	Internet Engineering Task Force.
IMSI	IMSI is an acronym for International Mobile Subscriber Identity. This is a unique number associated with the SIM card for GSM/UMTS.
LA	Abbreviation for “Large Account”. Terminals/applications for sending and receiving messages that are linked to the SMSC. The LA must have an SMS Large Account or SMS Access agreement with Telenor.
Mobil terminal	The same as an MS or mobile phone.
MO-SM	Mobile Originated Short Message – message from an MS to the SMSC.
MSISDN	MS telephone number.
MS	Mobile Station, i.e. GSM or UMTS mobile terminal.
MT-SM	Mobile Terminated Short Message – message from the SMSC to an MS.
SME	Short Message Entity – unit capable of sending or receiving an SM.
SMPP	Short Message Peer to Peer Protocol.
SMS	Short Message Service. Also used as a term for a ding.
SMSC	Short Message Service Centre – message centre for SMS.
TCP/IP	Transmission Control Protocol / Internet Protocol.
UDH	User Data Header – extra message header that can be

	inserted into the data field in a message.
UCP	Universal Computer Protocol.
VPN	Virtual Private Network.

2 General

SMS is a service for the transmission of messages between GSM terminals and between GSM terminals and LA linked fixed networks.

The messages are distributed according to the “store and forward” principle. This means, for example, that if an attempt is made to send messages to an addressee that is unavailable, the messages will be placed in a buffer in the SMS centre, SMSC, and an attempt will be made to deliver them at a later point in time.

Telenor offers two different products for the direct connection of the LA to the SMSC:

1. SMS Bedrift
2. SMS Access

In addition, services are offered that are linked to the SMSC via special middleware, such as CPA (Content Provider Access). These services will not be described in this document.

SMS Bedrift and SMS Access are based on use of the same technical solution, but are provided for different segments, and thus subject to different agreements.

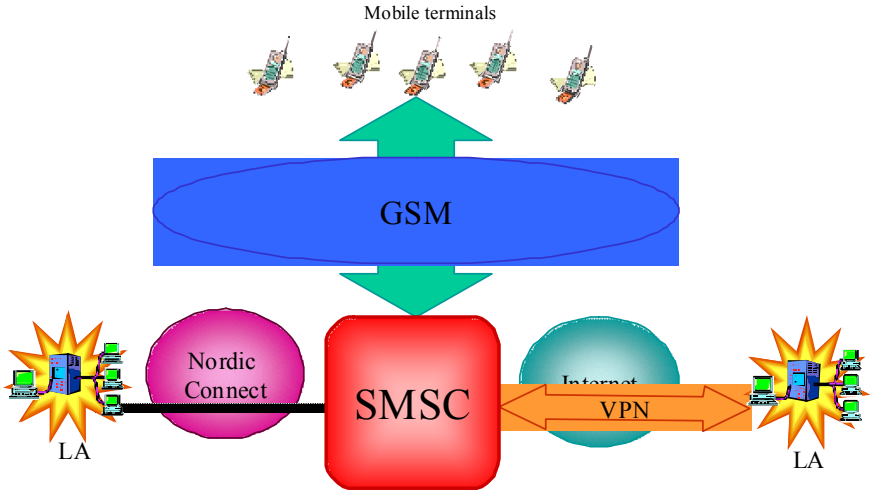


Figure 1 – Connections to the SMSC

3 SMS transmission

3.1 Transmission in the network

Voice and data traffic in the GSM network are transmitted over traffic channels. SMS differs, however, since SMS traffic is transmitted over signalling channels in the GSM network. The signalling channels are normally used for the transmission of control data. Due to historical reasons, however, it was decided to use these channels, and not the traffic channels, for SMS.

The SMSC is linked to the GSM network via the CCITT signalling system no. 7. To distribute traffic to an LA connected to the fixed network, the SMSC is linked to the Telenor internal IP network, which is linked to the Internet via firewalls. An alternative way of distributing traffic to a LA is through Nordic Connect, Telenors IP VPN network. For voice traffic, multiple exchanges may be involved in the transmission of a call. For SMS, only one SMSC is involved in the transmission of a message. All mobile subscribers normally use an SMSC with their home operator to send messages, whether they are on their home network or registered on another network. They can, however, receive messages from other SMSCs, provided Telenor has established an interconnection with the SMSC operator. Some operators stop foreign LA traffic. It is not possible to reach customers of these operators through Telenors SMSC using LA.

Only subscribers of Telenor or service providers in the Telenor network can send mobile originated messages to the Telenor SMSC using 5 digit LA numbers. Using an 8 digit LA number (optional additional service with SMS Access and Bedrift) mobile users from all operators that Telenor have established an SMSC interconnect with will reach Telenors SMSC. Our SMSC can deliver messages to subscribers in other networks with which an SMSC interconnect has been established.

The messages are transmitted in two separate steps:

1. From the sending terminal to the SMSC

2. From the SMSC to the receiving terminal

Each step is described in greater detail in the following sections.

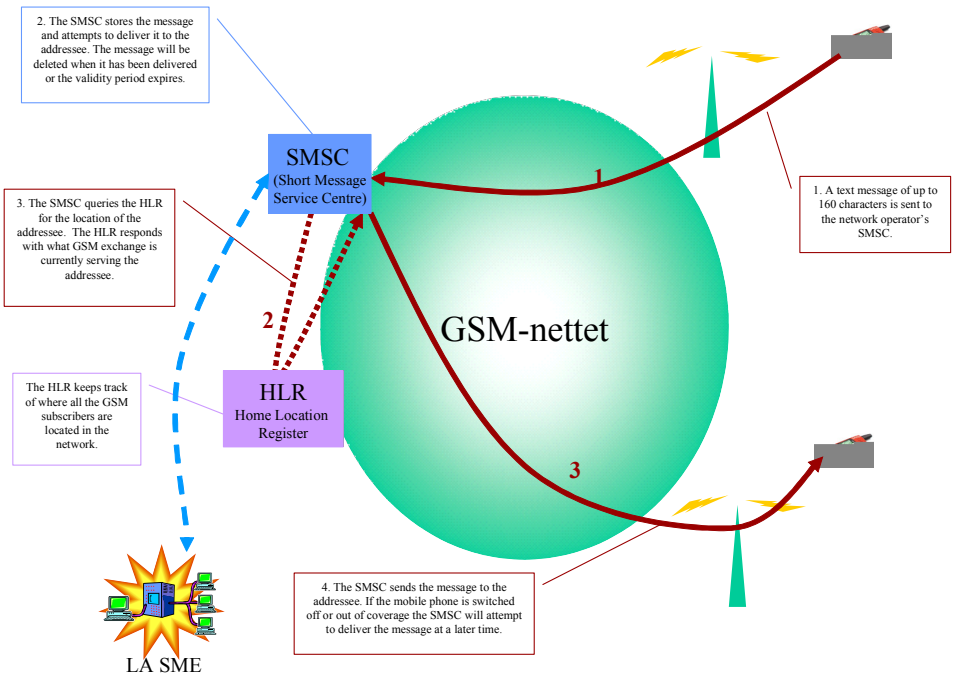


Figure 2 – SMS Transmission

3.2 Messages from GSM phones to the SMSC

A message that is sent from a GSM phone is transmitted via signalling channels in the GSM network to the SMSC to which the message is addressed.

The network address of the SMSC is stored in the phone[1]. Only subscribers of Telenor or service providers in the Telenor network are allowed to send to the Telenor SMSC.

The GSM network verifies first whether the sender is authorised to send the message before it is forwarded to the SMSC[2]. In addition, the network inserts the correct mobile number in the sender address in the message. The SMSC verifies first whether the incoming message can be approved for further handling. The number information is normally verified against internal black and white lists, and the message format/syntax is checked, before the message is approved. As soon as the SMSC has approved the message, it is placed in a buffer for further processing and the billing information is generated.

3.3 Messages from LAs to the SMSC

The LA sends messages to the SMSC via Nordic Connect or a VPN connection through the Internet.

The LA must establish one or more sessions with an SMSC IP address. The SMSC uses the TCP port number to differentiate between different protocols (SMPP or UCP/EMI) and access types.

The LA must be authenticated by a sender address and/or password. When the LA starts to send messages, the message will be validated by the SMSC. Number information is verified against any black and white lists, and the message format/syntax is checked before the message is approved. As soon as the SMSC has approved the message, it is placed in a buffer for further processing and the billing information is generated.

When the LA agreement is signed up the LA gets one numeric sender address. The LA can use different sender addresses as opposed to messages sent from GSM phones, where the GSM network inserts the sender address. Default is a five digit address as the LA`s legal sender address. An LA customer may order extra sender addresses (alphanumeric sender, additional numbers and sub

[1] Telenor's SMSC address is +4790002100.
[2] This means that it is not possible to send messages with a false sender address from a GSM phone.

numbers with more than five digits). The LA's opportunity to do so is subject to strict regulation pursuant to the agreement.

The LA can only send messages to GSM phones and not to other LAs. Messages can be sent to subscribers of any mobile operator nationally or internationally that Telenor has an interconnection agreement with, unless special technical limitations have been introduced in our SMSC or in the network of other operators.

Don't forget the regulations relating to the use of SMS in connection with advertising and marketing.

3.4 Messages from the SMSC (to LAs and mobile terminals)

When the SMSC has received and approved a message, it starts a procedure to deliver the message to the recipient.

The SMSC determines first, based on the number of the recipient, whether the message is to be delivered to a GSM phone or an LA and what message protocols are to be used. Then the message is forwarded to the units in the SMSC that will be handling the delivery.

The SMSC will then attempt to deliver the message. There are three possible delivery attempt outcomes:

1. The message is delivered. It will then be deleted from the SMSC.

2. The message cannot be delivered due to a permanent fault (e.g. the destination address does not exist). It will then be deleted from the SMSC.

3. The message cannot be delivered due to a temporary error (e.g. the LA at the destination address does not have any contact with the SMSC). An attempt will be made then to deliver it later. If the message cannot be delivered before the expiration of the message's validity period, it will be deleted from the SMSC.

Messages to mobile terminals can be received when the terminal is in call mode or when it is free.

4 Service description

4.1 Services for LAs

Telenor offers two products, which are technically about the same solution, for the connection of LAs, SMS Bedrift and SMS Access. Both products are designed for volume users of SMS and require a connection to an application so that the service can be used to send and receive SMS messages. Telenor does not deliver this application.

SMS Bedrift is a subscription for companies that need to be able to communicate internally by SMS via a mobile and an application at the company's premises (i.e. CRM, email, m2m etc.).

SMS Access is a subscription for professional SMS users that need to be able to send and/or receive a large number of messages in order to offer services to the mobile market. If the company wants to add value to the SMS (content, solutions etc.) for resale of SMS traffic they should use SMS Access.

A more detailed description of the LA services and the requirements for the LA applications are provided in the "Application Requirements" document, which may be found under the SMS Access product at http://partnerportalen.no and is also an appendix to the agreement.

The commercial terms for SMS Access and SMS Bedrift will be found in the Telenor general terms as well as an appendix to the SMS Bedrift/SMS Access agreements.

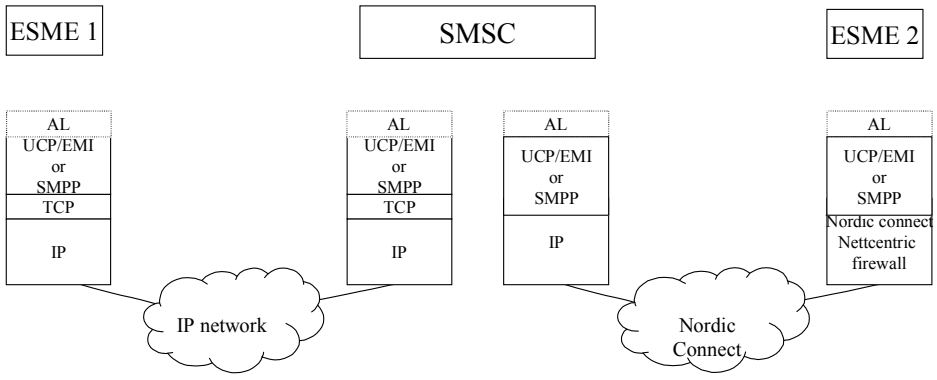
In addition, SMS services from/to fixed network terminals that are linked to the SMSC via special middleware are offered, for example CPA (Content Provider Access).

These services will not be described in this document. More information may be found at http://partnerportalen.no and http://cpa.telenor.no,

4.2 Connection of LAs

LAs can either use Nordic Connect or the Internet for connection to the SMSC. It is also possible to connect applications via a mobile subscription, but this will only be appropriate for applications with very low traffic volumes. This connection method is not described in greater detail in this document.

An LA can set up one or more simultaneous TCP/IP sessions with the SMSC. If the SMSC is to send messages from mobile phones to an LA, it must use sessions set up by the LA. If the connection is down, the messages in the SMSC will be buffered until the LA has established a session. The size of the buffer reserved pr LA will vary (LA with high traffic have normally > 10.000). When the buffer limit is reached new messages will be rejected of the SMSC.



IP and underlying protocols correspond to OSI layers 1 – 3

TCP corresponds to OSI layer 4

UCP/EMI and SMPP correspond to OSI layers 4 - 7

AP – Application Protocol (such as Nokia Smart Messaging) – OSI layer 7

Nordic connect, Nettcentric firewall between customer and Telenors Network

Figure 3 – Protocol layers between the Application Server (LA) and the SMSC

4.2.1 Nordic Connect

A Company with Nordic Connect (Telenor IP VPN service) can use this as a connection to the SMSC. When activating the SMS LA service the customer orders for communications to the Telenor SMS C via a Net centric Firewall.

4.2.2 Internet

Access via the Internet presupposes that the company uses Telenor VPN (Virtual Private Network) to maintain security. A VPN consists of nodes in a public network, the Internet in this case, that communicates between themselves and use encryption technology so that the traffic between the nodes cannot be read by unauthorised users, in the same manner as if the nodes were connected via a private network. See the special white paper for this product for more information on Telenor VPN.

4.3 Billing of messages

The messages are billed when they have been approved by the SMSC, **regardless** of whether the message has actually been delivered to the receiving terminal. If the SMSC rejects a message it will not be billed.

The price for sending messages with either SMS Access or SMS Bedrift depends on the number of messages sent per month.

4.4 Application protocols

When SMS was standardized as part of the GSM system, only interaction with the GSM system was included in the standard. Other functionality in the SMSC, including the protocols to LAs connected to the fixed network, were not standardized, and all the SMSC suppliers use proprietary protocols as a result of this. However, several SMSC suppliers also support competitive protocols as an alternative to their own protocols. The Telenor SMSC supports two application protocols for LAs, UCP/EMI and SMPP. Most of the LAs connected to The Telenor SMSC use UCP/EMI.

4.4.1 UCP/EMI

UCP was originally an international standard for the European pager system ERMES. The UCP protocol has been developed further for SMS, but since the expanded protocol is proprietary and not an international standard, it has been designated as "EMI". The EMI protocol is referred to, however, as UCP, EMI and UCP/EMI.

EMI is an application protocol for the transmission of SMS messages between the SMSC and LA. Telenor supports TCP/IP as bearer of EMI.

A UCP/EMI message sequence is referred to as an "operation". A number of operations have been established for the transmission of different message types, the most common of which are "Operation 51", message from an LA to an SMSC and "Operation 52", message from an SMSC to an LA.

Each message sequence consists of an "operation" and a "result". The sender, e.g. the SMSC for Operation 52, sends the operation, and the recipient, the LA in this case, returns an acknowledgement with the result of the transmission.

The operations in UCP/EMI that are supported for direct access to the Telenor SMSC are illustrated in Table 1.

Operation no.	Name	Application
31	MT Alert	Used primarily by the LA to keep a session to the SMSC alive during a long period of inactivity, so that the LA can receive incoming messages.
51	Submit Short Message	Used for sending messages from LAs to the SMSC. The UCP/EMI message is converted to a MT-SM message in the SMSC.
52	Delivery Short Message	Used by the SMSC to deliver messages to the LA. A MO-SM message to an LA is converted to a UCP/EMI message in the SMSC.
53	Delivery Notification	Used by the SMSC to deliver end-to-end acknowledgements – notifications – to the LA.
60	Session Management	Used by the LA to establish a session with the SMSC or change a password.
61	Provisioning Actions	Used to administer LA specific black or white lists in the SMSC.

Table 2 - UCP/EMI supported by Telenor

```
04/00137/O/51/90576916/19973//0/////////////3//4465747465206572206 56E2074657374206672612054
656C656E6F72204D6F62696C2E//0/0//1///////5F
```

Example of UCP/EMI Operation 51

4.4.2 SMPP

The SMPP (Short Message Peer-to-Peer) protocol is an industry standard that is maintained by the SMS Forum (http://www.smsforum.net).

SMPP builds on the exchange of PDU (Protocol Data Unit) between the LA[3] and SMSC over an underlying TCP/IP.

The SMPP protocol defines:

- a set of operations for the exchange of messages between LAs and SMSCs

[3] In SMPP documentation the term ESME is used instead of LA.

- what data must be exchanged between LAs and SMSCs during SMPP operations

Each SMPP operation must consist of a request PDU from the sender and a corresponding response PDU from the recipient.

In SMPP the LA is responsible for the establishment of a session with the SMSC. This is done by a "bind" message. It can establish sessions to send from LAs to the SMSC ("bind receiver"), from the SMSC to the LA ("bind transmitter") and vice versa ("bind transceiver").

"Outbind", i.e. establishment of a session with the LA by the SMSC, is part of the SMPP protocol, but Telenor does not support this.

The Telenor SMSC supports the most important operations in SMPP 3.3 and SMPP 3.4, but it does not fully support the protocols.

The operations in SMPP that are supported for direct access to The Telenor SMSC are illustrated in Table 2.

Operation	Application
BIND_TRANSMITTER	Open a session where the LA (ESME) can send messages to the SMSC.
BIND_RECEIVER	Open a session where the LA (ESME) can receive messages from the SMSC.
BIND_TRANSCEIVER	Open a session where the LA (ESME) can send messages to and receive messages from the SMSC.
UNBIND	Terminate a session.
GENERIC_NACK	Negative acknowledgement of an operation with an error in the message header.
SUBMIT_SM	Operation to send messages from LAs to the SMSC.
DELIVER_SM	Operation to send messages from the SMSC to the LA.
DATA_SM	Operation to send data from the LA or the SMSC. Can be an alternative to the "submit" or "deliver" operation. Can also be used by the ESME to query whether a message is stored in the SMSC and to transmit end-to-end acknowledgements .
QUERY_SM	Used by the LA to determine the status of a previously sent message.
CANCEL_SM	Can delete previously sent messages that have not yet been delivered.
REPLACE_SM	Used by the LA to overwrite a message in the SMSC.
ENQUIRE_LINK	Used by the LA and ESME to verify that the link is up.

Table 2 - SMPP PDU operations that are supported by Telenor

```
00 00 00 3E 00 00 00 04 00 00 00 00 00 00 00 01 00 00 00 00 00 00 34 31 34 30 31 32 35 36 00 00 00 00
00 00 00 00 00 00 15 54 65 73 74 20 66 72 61 20 53 4D 50 50 20 E6 F8 E5 20 C6 D8 C5
```

Example of SMPP operation Submit_SM

4.5 API

There are several APIs that the LA can use to develop SMS applications.

Telenor SMSC Service (TSMSCS) is a free program that can be used by the LA to carry out the actual communication with the message centre. TSMSCS – an NT service – handles all the technical transmission details and makes it possible to send and receive messages by just copying small files with a specific format into the input and output directories. The program uses EMI/UCP.

There are also several other API solutions available from our partners. Contact Telenor at smsaksess@telenor.com if you would like more information.

5 General functionality in the SMSC

5.1 Approval of messages in the SMSC

When the SMSC receives a message it is validated based on specific criteria.

If the message is rejected, it is deleted. No CDR is generated, and it is not billed either. The sender (LA or MS) receives a negative acknowledgement. The MS will also receive a negative

acknowledgement if the message is stopped before it reaches the SMSC. The most important reasons why messages are rejected are:

- Sender or recipient's address has been blacklisted.
- Congestion in the network between the MS and SMSC.
- Recipient has too many undelivered messages stored in the SMSC.

If the message is approved it is stored temporarily on a disk and a CDR (Call Detail Record) is generated, which is used to bill the message. The SMSC will then start a sequence to deliver the message. There are three possible delivery attempt outcomes:

1. The message is delivered (to the MS or LA).
2. The message is not delivered due to a temporary error. An attempt will then be made to deliver the message later.
3. The message is not delivered due to a permanent fault. The message will then be deleted from SMSC.

Several attempts will be made to deliver messages that cannot be delivered due to "temporary" errors. The most common reasons for temporary errors are:

- The MS/LA does not have contact with the network (turned off, overloaded network, etc.).
- The phone memory is full.

The most common reasons for permanent errors are:

- The validity period for the message has expired.
- The addressee does not have a valid GSM subscription or the subscription is blocked for mobile terminated SMS.
- The message is in a format that the receiving phone does not understand.

5.2 Delivery mechanisms

SMS is not a real-time transmission system for messages; it makes use of "store and forward". This means that the receiving terminal does not need to be in contact with the network when a message is sent, as is the case for real-time services such as voice. This also means that the time it takes from when a message is sent to when it is received will vary. If the SMSC cannot reach the receiving terminal during a transmission attempt, the message will be stored and a new transmission will be attempted at a later point in time, usually after 5 minutes. Delivery of the message will be attempted until it succeeds or until the message's validity period expires. The validity period is a parameter that is set by the sender and can vary from 0 (a "Single Shot" message) to 7 days. If the sender has not set any validity period, then the SMSC sets a standard validity period, which is 3 days.

5.2.1 "Alert Service Centre"

If the delivery of a message to an MS fails due to a temporary error, the GSM network registers that the specific SMSC has stored a message to the addressee MS, that by setting the "Message Waiting" flag. When the MS is available again, the GSM network notifies the SMSC of this by sending the message "Alert Service Centre" to the SMSC, which will then retransmit the message.

5.2.2 Regular retransmission

The network will normally detect the MS if it receives or initiates a call, sends an SMS or performs a location update with the network, but situations may arise where the MS is logged on to the network

without the network being aware of it. In these instances the messages will remain stored in the SMSC. To avoid long delays, an alternative delivery mechanism has been established that makes regular attempts to transmit stored messages. In the Telenor network the standard retransmission pattern is set at two attempts at 5-minute intervals, then two attempts at one-hour intervals, and finally every fourth hour until the validity period expires.

If a message is delivered then all the other buffered messages to the same terminal will be delivered immediately.

5.2.3 Acknowledgements

There are two acknowledgement levels for messages. The lowest level looks at the segment between the SMSC and the terminal, while the highest level looks at the message from the sending to the receiving terminal.

When a message from a terminal is accepted by the SMSC an acknowledgement is returned to the sender. If the message is blocked or not accepted, a negative acknowledgement is sent from the network node that rejects the message. It is this acknowledgement that displays “message sent” or “message could not be sent” on the mobile terminal.

In addition, there is an end-to-end acknowledgement that the sender must request for each individual message.

If the sender is a mobile terminal, it can request two types of end-to-end acknowledgements, Notifications and Status Reports. To receive a Notification, the message text must start with *k#. The SMSC will then return the message “Delivered”, “Stored – delivery will be attempted later” or “Cannot be delivered”.

The status report is standardised by ETSI, but all terminals do not support it. The status report is activated in the menu on the mobile terminal. The different terminals present the status reports differently. Some terminals present it in the original message, while others present it as a separate message in the inbox.

LAs can also activate an end-to-end acknowledgement by setting necessary parameters in UCP/EMI or SMPP operations that are sent to the SMSC.

5.2.4 Validity period

The validity period may be specified by the sender per message and may vary from 0 (a “Single Shot” message) to 168 hours. If the sender does not set a validity period, the SMSC will set a standard validity period, which is 72 hours.

The MS sets the validity period in a relative format, i.e. the number of time units. An LA with the UCP/EMI protocol must use the absolute format, i.e. it must set the date and time for the expiration of the validity period. SMPP supports both absolute and relative formats.

5.2.5 Delivery sequence

Messages that are received are stored in the SMSC and an attempt is made to deliver them to the sender in the order they were received, i.e. according to the FIFO (First In First Out) principle.

There is one exception to this principle. When the validity period for a message expires a last attempt to send the message is made before it is deleted.

It is possible to override the FIFO queue through a so-called priority function, which can be activated for each LA. Prioritisation is a misleading term, since a message with the priority flag set will only be placed first in the delivery queue to the mobile if there are messages that have already been buffered.

This function will not, as one would normally expect from a real priority function, improve the delivery quality for time critical applications during high-volume network traffic.

The function has been used to increase the quality of certain special applications that have problems with the FIFO principle.

5.2.6 Single Shot

The sender of a message can define the message as a “Single Shot” message. In this case only one attempt will be made to send the message before it is deleted from the SMSC, regardless of the outcome of the transmission.

Telenor only offers “Single Shot” for messages from LAs.

End-to-end acknowledgement is also supported for “Single Shot”.

5.3 Message composition

5.3.1 Message length

The maximum length for a single message is 160 characters of 7 bits (septets) or 140 characters of 8 bits (octets). If a larger volume of information is to be transmitted, it needs to be transmitted in multiple individual messages. A UDH can be used to link the messages. Phones that support this can combine the messages so that the addressee only sees one long message. Logos, picture messages and ring tones often use this method.

There are also other ways of linking messages. Many phones automatically generate the number of messages that are required to accommodate a text. The addressee receives the messages individually, often with the text “message X of Y” at the start of the message.

If an LA is to send messages that are longer than what can be accommodated in an SMS message, it will be the LA itself, and not the SMSC, that must split them up into individual messages.

5.3.2 Character set

Normally, the 7-bit GSM Default Alphabet is used (which has a lot in common with 7 bit ASCII) for the transmission of text, while 8-bit characters are used for the transmission of binary content, i.e. logos and ring tones. In addition, 16-bit characters (Unicode) are supported and can be used for the transmission of various exotic character sets, such as Chinese.

5.3.3 Message format

An SMS message consists of a message header and a field for user data. The message header contains, for example, information on the addressee and receiver, as well as other characteristics of the message. User data can be in 7-bit, 8-bit or 16-bit format. A separate message header can also be defined, a UDH (User Data Header), as part of the user data. The purpose of this is to transmit information that is not accommodated in the ordinary message header. A UDH is used, for example, in messages that contain logos or ring tones.

DA	Destination Address	If the DA has 3 to 5 digits, it is understood that the message address is an LA. Other number ranges that may be assigned to an LA can also be defined. An attempt will be made to deliver as a fax to DAs that are non-geographic Norwegian numbers in the fixed network. All other DAs are assumed to be GSM/UMTS phones.
OA	Originator Address	The OA is inserted by the GSM network for MO SMS. The LA inserts the OA for SMS from an LA. This can be in a numeric or alphanumeric format.
VP	Validity Period	Defined as maximum 7 days by Telenor. The VP is set in principle by the sender. If the field is empty, the SMSC value VP=72 hours is used.
SCTS	Service Centre Time Stamp	Time when the message is received by the SMSC. If two messages to the same MS reach the SMSC simultaneously, the SCTS is incremented by 1 second in one of the messages.
PID	Protocol Identifier	Parameter that indicates what protocol to use for delivery of the message, i.e. fax, e-mail, mobile phone, etc. Can be selected by the sender or set by the SMSC.
DCS	Data Coding Scheme	This parameter can identify the following: - alphabet (7, 8 or 16 bits) - message class, i.e. to what unit in the mobile station the message shall be sent to (SIM card, internal storage, externally linked terminal) - compression - automatic deletion of message - Message Waiting (Voice mail, Fax, E-mail)
UDHI	User Data Header Indication	Indicates that the message text contains a message header. This is used, for example, for picture messages, logos and ring tones.
SR	Status Report	Requests an end-to-end acknowledgement.

Table3 – Important information in the message header

5.3.4 UDH (User Data Header)

Some of the expanded functionality in the SMS presupposes that some of the content field in the message is used as a message header, UDH (User Data Header). The UDHI field indicates whether the content field in the message contains a UDH. The most common applications of a UDH are:

- Linked messages
- Port addressing
- EMS
- WAP messages
- SIM toolkit

5.3.5 EMS (Enhanced Messaging Service)

EMS is a relatively new addition to the SMS standard for the formatting of different content types. The reason for this is the need for supplier-neutral solutions for content, for logos and ring tones, for example. Since this was not standardised at the time when such solutions started to appear, it has resulted in the fact that most of the existing solutions are proprietary, i.e. specific to the individual mobile supplier.

The most important formats that are standardised in EMS are:

- Text formatting (bold, italic, etc.)
- Pictures/animations/vector graphics
- Sound
- vCard/vCalendar

5.4 Legal sender address

Every new LA is allocated a five-digit LA short number as legal sender identity, this is also the address the mobile use to address the LA. Both LA services can order additional services with several LA short numbers on the same invoice. As an example five digits E-164 telephone numbers, which are administrated by The Norwegian Post and Telecommunication Authority can be used as short numbers for LA if the customer is the owner (or is running service for the owner) of the telephone number. It is the responsibility of the subscriber of the SMS Access/SMS Bedrift service to ensure that the user is the legal owner of the telephone number.

A LA customer can order an alphanumeric sender address, but SMS transmitted from a mobile can not address an alphanumeric short numbers. Alphanumeric sender address can as a maximum have 11 characters and the company's name is the legal sender address.

The right to use sub numbers, alphanumeric sender and additional numbers are regulated by the LA service agreement and are subject to special changes.

5.4.1 5-digit telephone number as a short code

The Norwegian Post and Telecommunication Authority has given mobile operators the opportunity to offer companies with 5-digit telephone numbers the chance to use these as short codes for sending SMS messages. This applies to telephone numbers in the 02000 – 09999 range. The conditions allowing a company to use its 5-digit telephone number as an SMS short code is as follows:

- When ordering SMS Bedrift, the Customer must prove in writing that he has the right to use the relevant 5-digit telephone number.
- When assigning the right to use this number, the Customer must inform the operators of this in writing, and this will not become valid until the relevant change has been approved by the Norwegian Post and Telecommunication Authority.
- Messages must not be used to charge for content services, but should be priced in the usual manner.
- If the Customer intends to be able to receive SMS messages from every mobile customer in Norway, the Customer must have the relevant service with every mobile operator and MVNO in Norway with their own SMS exchange.
- The right of use ceases to apply when the Customer no longer has the telephone number. The Customer must inform mobile operators in the event of this right ceasing to apply.

Telenor delivers this 0xxxx number as an additional service to SMS Bedrift or SMS Access. Additional services can be ordered by the <customer information scheme> and service agreement. The owner of the five-digit phone number form the Norwegian Post and Telecommunication Authority and the owner of the LA agreement with Telenor shall be the same. If it is of the customers' interest Telenor can refer to several cooperating partners that can, for the customers cost, prepare the installation.

5.4.2 Messages to LA's from external Mobile Subscribers – "Foreign Subscriber Gateway"

Telenor offers as an additional service to SMS Access/SMS Bedrift the capability of receiving SMS from subscribers of other networks/operators than Telenor. The LA will be assigned an 8 digit number within the Telenor E164 Numbering plan for this purpose. This number will be assigned in addition to the 5 digit short number of the LA. Mobile originated SMS addressed to the 8 digit number will be received by the LA.

Some characteristics of the additional service:

- In order to be able to submit Mobile Originated SMS to the LA the MS must belong to an operator with SMS interworking agreement wit Telenor and the MS have to be logged onto a network to which interconnect agreements with Telenor are established.
- If the LA needs permission to use the 8 digits number (with or without international prefix +47) this will be assigned on SMSC when ordering the additional service.
- If the 8 digit number shall be used for Mobile originated SMS from foreign networks the international prefix (+47) has to be inserted.
- Only numbers that are assigned for the Foreign Subscriber Gateway can be used for this purpose.
- Each LA can be assigned up to five 8 digit numbers.
- Mobile Terminated SMS from the LA, with the 8 digit number as originating address will be invoiced to the SMS Access/ SMS/Bedrift subscription of the additional service. Only the total number of SMS will be specified on the invoice.

8 digit numbers can be ordered as an additional service to the SMS Access/ SMS/Bedrift subscription. The standard ordering form can be used.

5.5 Sub addressing of messages to LA's.

Normally mobile terminals use the four (CPA) or five-digit LA short number to address an LA. However, it is possible to assign additional numbers or number series to an LA in the SMSC.

The LA normally uses the short number as a prefix followed by a sub address of up to 11 characters. The maximum for a sub address is a range of 10 digits in addition to the short number.

The sub address used by the sender will be sent transparently to the LA. The most common applications of sub addressing are:

1. Link incoming message to the LA and message sent from the LA by using a sub address as a reference number. The LA uses, for example, the sub address 26xxx*1234567890* as the sender address for a message. When the mobile terminal replies to the message with the "reply" function in the terminal, it will be sent to the LA with the address 2677x*1234567890.*

2. Address various applications in an LA. 26xxxxxxxxxxx1, 26xxxxxxxxxxx2 and 26xxxxxxxxxxxx3 can, for example, represent different services at LA 26xxx.

Conditions of use of sub numbers are the following;

Sub numbers shall not be promoted independently (single numbers or range). Mobile users shall not be exposed for short numbers in the sub number range without in advance being informed of what the use of this is. Mobile users shall at the first time communicate with the original five-digit short number. Sub numbers can be used at the same conditions for five digit phone numbers from the Norwegian Post and Telecommunication Authority.

LA customers must aware that the SMSC can handle a maximum of 16 digits (0047 uses 4 of those if used). The service <number range> can be ordered in the <customer information scheme>.

The following number ranges can be used as sub-number range;

Five-digit Short Number	Subnumber range (every range must be ordered separately)	From number	To number
26xxx	6	26xxx0	26xxx9
26xxx	7	26xxx00	26xxx99
26xxx	8	26xxx000	26xxx999
26xxx	9	26xxx0000	26xxx9999
26xxx	10	26xxx00000	26xxx99999
26xxx	11	26xxx000000	26xxx999999
26xxx	12	26xxx0000000	26xxx9999999
26xxx	13	26xxx00000000	26xxx99999999
26xxx	14	26xxx000000000	26xxx999999999
26xxx	15	26xxx0000000000	26xxx9999999999

Five digit Short number	Subnumber range (every range must be ordered separately	From number	To number
27xxx	6	27xxx0	27xxx9
27xxx	7	27xxx00	27xxx99
27xxx	8	27xxx000	27xxx999
27xxx	9	27xxx0000	27xxx9999
27xxx	10	27xxx00000	27xxx99999
27xxx	11	27xxx000000	27xxx999999
27xxx	12	27xxx0000000	27xxx9999999
27xxx	13	27xxx00000000	27xxx99999999
27xxx	14	27xxx000000000	27xxx999999999
27xxx	15	27xxx0000000000	27xxx9999999999

6 Special LA problems

6.1 Handling of incoming messages

An LA must be designed so that it can handle all incoming messages regardless of the format, since it is quite common that mobile terminals attempt to send messages to an LA in an inappropriate format, such as a picture message. If the LA sends a negative acknowledgement for such a message, the message will be placed first in the queue in the SMSC and block any messages behind it until the front message is deleted due to expiration of the validity period. The LA must therefore return a positive acknowledgement to the SMSC for all messages it receives, even if they arrive in a format that the LA cannot decode.

6.2 Time critical applications

If SMS is to be used for time critical applications, it is important to be aware of the fact that SMS is not designed for the transmission of data in real-time and that the time that elapses from sending to receiving may vary significantly, even if the service is working as it should. If the SMSC sends to a phone with radio coverage that is switched on, the message will normally be delivered on the first transmission attempt.

An attempt will normally be made to transmit messages that fail after 5 minutes. This means that the messages that do not reach the recipient within a few seconds will quickly become delayed by minutes or hours without there being any special problems in the network.

It is possible to improve the real-time experience of the system by well-thought-out solution design.

In many cases the biggest problem is not the fact that the message is delayed, it is the fact that the sender thinks that the message has arrived when it is stored in the SMSC. A possible solution is for the LA to request an end-to-end acknowledgement for all messages sent If a message does not arrive, the sender can implement alternative measures such as sending the message to another terminal or using alternative means of communication to transmit the information.

It may also be helpful to let the application, and not the SMSC, handle the procedure for future deliveries. This can be accomplished by sending messages as a “Single Shot”, i.e. the SMSC only makes one attempt to deliver the message and deletes it afterward. A “Single Shot” must be combined then with an end-to-end acknowledgement.

6.3 Capacity limits

The data rate for the transmission an SMS message over the radio interface is quite low (<< 1 kbit/sec). A single GSM base station can normally handle between 4 and 8 simultaneous SMS transmissions. This means that applications that require a high transmission capacity to a single mobile terminal may experience problems. For example, applications that are linked to the GSM

network via a mobile terminal, and not as an LA over a fixed line, will only be an acceptable solution for very low traffic volumes.

7 References

1 **Application Requirements. Telenor, Requirements to applications for transmission and reception of Short Messages via the Telenor SMSC**

2 **EMISPEC 5.0, Short Message Centre External Machine Interface Specification, CMG Telecommunications & Utilities BV**

3 **ETSI ETS 300.900 ed. 3 (Or 3GPP TS 23.038), Alphabet and language-specific information, European digital cellular telecommunications system (phase 2+)[4]**

4 **ETSI ETS 300.901 ed. 5 (Or 3GPP TS 23.040), Technical realisation of the Short Message Service (SMS) – Point-to-Point (PP), European digital cellular telecommunications system (phase 2+)**

5 **SMSC API 4.0 User Manual, LogicaCMG [5]**

6 **Telenor VPN Solution**

7 **Short Message Peer to Peer Protocol Specification v3.4, SMPP Developers Forum (www.smsforum.net)**

8 Document history

Version	Date	Comments
2.0	May 2006	New service names, new info use of sub numbers and five digit phone numbers as short numbers for SMS
2.2	September 2007	New chapter Foreign Subscriber Gateway Editorial changes
2.3	June 2009	Removal of Frame Relay, X25 and editorial changes

[4] Available from http://www.etsi.org or http://www.3gpp.org
[5] Available from http://www.logicacmg.com/