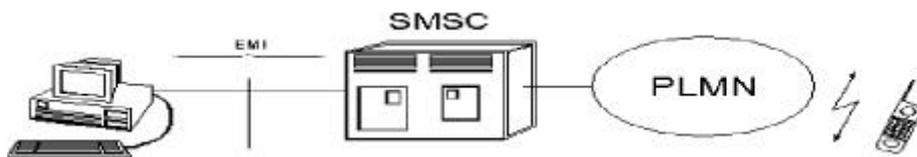


Short Message Service Centre (SMSC)
External Machine Interface (EMI)
Description

Version 2.2

January 2001



Contents

1	Introduction	4
1.1	Position of interface	4
1.2	Interface history	5
1.3	Access numbers	6
1.4	Session Management	6
1.5	Virtual Short Message Service Centre concepts (VSMSC)	6
2	Structure of the EMI messages	7
2.1	Example	8
3	EMI operation overview	10
3.1	Application initiated commands	10
3.2	SMSC initiated operations	11
4	EMI operations Syntax	12
4.1	Address syntax	12
4.2	Parameters used in operations	12
4.3	Parameters used in responses	16
4.4	Basic operations	17
4.4.1	Call input operations (OT-01)	17
4.4.2	SMT alert operation (OT-31)	18
4.5	Extended operations	19
4.5.1	Abstract Data Types	19
4.5.2	Submit short message operation (OT-51)	22
4.5.3	Delivery short message operation (OT-52)	25
4.5.4	Delivery notification operation (OT-53)	27
4.5.5	Inquiry message operation (OT-55)	29
4.5.6	Delete message operation (OT-56)	30
4.5.7	Response inquiry message operation (OT-57)	32
4.5.8	Response delete message operation (OT-58)	34
4.6	Examples of the extended UCP messages	36
4.6.1	Transparent data message	36
4.6.2	Alphanumeric message	36
4.7	Inquiry and Delete functionality	37
Annex A	Error Codes Overview	38
Annex B	Character Sets used in the SMSC	39
Annex C	Error messages and codes reported in notifications	41
Annex D	Contents of Control messages	42
Annex E	Explanation of the RPID field and the new Extra Service XSer field	43
Annex F	SMSC Modem settings	46
Annex G	Contact persons	47
Annex H	Revision marks	48

Preface

This manual describes the interface used between the SMSC System and other computer systems and applications on the fixed network side. It is based on [1] and has been adapted to the requirements and characteristics of MMO's SMSC. The interface is based on the ERMES UCP (Universal Computer Protocol) with some SMSC-specific extensions.

References

- [1]** ETS 300 536, Technical realization of the Short Message Service (SMS) Point-to-Point, GSM 03.40, version 7.1.0
- [2]** Large Account specific extensions, Mannesmann Mobilfunk GmbH, Version 2.1, Mai 1999
- [3]** Alphabets and language-specific information, GSM 03.38, version 7.0.0
- [4]** Short Message Service Centre External Machine Interface, CMG Informatietechnik b. v., Version 3.1.2, January 1999
- [5]** ETS 300 133-3, Paging Systems; European Radio Message System (ERMES) Part 3: Network aspects, Section 9

Intended Audience

All persons involved in the design and implementation of applications on external computer systems that have to interact with the SMSC.

For professional systems that require high performance and extra functionality please refer to [2]. Provision of this extra functionality is a matter of contracts. Please refer to Annex G for contact persons.

Abbreviations used in this document

ACK	Positive Acknowledgement
ADT	Abstract Data Types
CLI	Calling Line Identity
CMG	Computer Management Group
EMI	External Machine Interface
ERMES	European Radio Messaging System
ETS	European Technical Standard
FAX	Facsimile
GSM	Global System for Mobile communications
UDH	User Data Header
LA	Large Account
ME	Mobile Equipment
MMO	Mannesmann Mobilfunk
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
NAK	Negative Acknowledgement
NPI	Numbering Plan Identification
O&M	Operations and Maintenance
PC	Personal Computer
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
SM	Short Message
SME	Short Message Entity
SMS	Short Message Service
SMSC	Short Message Service Centre
SMT	Short Message Terminal
TON	Type Of Number
UCP	Universal Computer Protocol
UD	User Data
VMS	Voice Mail System
VSMSC	Virtual Short Message Service Centre

1. Introduction

For submission and reception of Short Messages the Short Message Service Centre can interface with (among others):

- D2 or other GSM Mobile subscribers with SM capable mobile stations (MSs) in the PLMN,
- Applications on external machines (e.g. PCs, UNIX based machines), on which we will focus in this document.

The SM transaction must involve, however, at least one MS.

An example of such a dedicated PC application would be a system that monitors the status of a computer system. It can generate a short message to alert support staff if something goes wrong.

Note: Messages cannot be sent to / received by D1, E+ or E2 mobile subscribers.

IMPORTANT NOTE

As new requirements and improvements may be taken into account, the interface may change, backward compatibility shall be given.

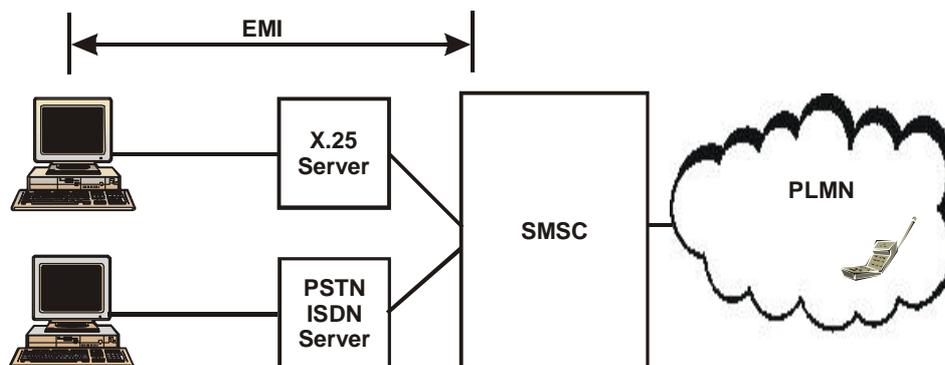
The information in this document is subject to change without notice and should not be construed as a commitment by MMO. MMO assumes no responsibility for disadvantages caused by such changes or any errors that may appear in this document.

The External Machine will be referred to as 'PC', but it can, of course, be any application system.

In order to allow any service provider to develop dedicated applications an interface was developed to access SMSC functions. This manual describes that interface.

1.1 Position of interface

When viewed from the external application, the EMI provides access to the SMSC functions: submission of Short Messages, and reception of Short Messages and notifications. The SMSC can be viewed as a Black Box: Short Messages are directed to the GSM mobile telephone of the recipient. The SMSC and the PLMN only function as relay mechanisms for those messages. The only visible action of the SMSC apart from this, is the provision of notifications: upon request the SMSC will notify the originator of the SM regarding the delivery status of the SM.



(Note: PAD access (X.29) is not foreseen as a general user access to the SMSC)

Figure 1.2 EMI: Internal view

The EMI can use the following lower level protocols as a carrier:

- X.25
- X.31
- PSTNa (analog modem lines)
- ISDN (V.110 and transparent X.75)

The setup of the connection between the SMSC Platform and the remote machine depends on the carrier used. Once the connection is established, the EMI commands can be used.

Please note that correct interworking with the SMSC can be guaranteed just for the case if error-control (MNP4 or LAPM) is used for the PSTNa access. Refer to Annex F for further information.

Please note that correct interworking with the SMSC can be guaranteed just for the case that transparent X.75 and not any protocol derived of X.75 or set on top of X.75 is used for the ISDN access.

1.2 Interface history

The SMSC External Machine Interface (EMI) is based on an extended subset of the UCP protocol defined for the ERMES paging system in ETS 300 133-3 [6]. When referring to 'UCP' in the context of the SMSC, the EMI, the extended subset of the ERMES UCP, is meant.

In the SMSC the UCP protocol was chosen as the basis for the EMI because

1. it saves the trouble of having to re-invent a protocol structure for an interface that is very similar to the ERMES interface to external machines.
2. it allows application developers to use a single mechanism to interface to both ERMES based paging systems and the SMS.

In order to provide access to the more extensive set of SMS commands, it was necessary to extend the UCP definition with some additional, SMSC specific commands, such as 'Submit Short Message Operation' and 'SMT alert operation'.

1.3 Access numbers

The SMSC can be accessed for use with the EMI protocol on the following numbers :

PSTN/Modem	ISDN (public)	ISDN (LA)	X.25 (LA) / X.31 (LA)
01722278052 *)	01722278000	distributed on request	distributed on request
01722278025 *)	01722278010		

(LA = Large Account)

Note:

*) This number should be used preferred since 01.06.00. This access number works with error-control (MNP4 or LAPM, not with non-error correction) mode and provides higher availability and performance than (the old known) 01722278020 (which can still be used).

1.4 Session Management

If a connection is established to the SMSC via PSTNa/Modem the following session management is used:

The session management uses a delay between the submission and the acknowledgement of messages in order to regulate the throughput. After the 'Connect' message has been received by the SMSC a timer is started. When a message is submitted to the SMSC the ACK shall be sent at timer expiry and the timer is then reset. Any message which is submitted to the SMSC between a previous message submission and its acknowledgement shall simply be discarded. **Therefore, the external application must wait for an acknowledgement before sending a new message.** A value between 40 and 60 seconds as a maximum should be appropriate. If the connection is released before the acknowledgement has been sent to the application, the message submitted shall be discarded.

For customers, however, which own Large Accounts (X.25 LA, ISDN LA), the option is provided to submit large numbers of messages in a short amount of time.

To be a Large Account the customer must obtain a definite volume of short messages.

This is a matter of contracts. Refer to [2] for further information.

1.5 Virtual Short Message Service Centre concepts (VSMSC)

Large accounts that access the SMSC on a CLI session (i. e. X.25 or ISDN) may use the D2 SMSC as virtual SMSC. This means that the Large Account may use the SMSC as if it is its own SMSC.

The virtual SMSC (VSMSC) is characterised by a specific SMSC address defined by a three digit suffix, hence every address has the following structure: +49 172 227 0xyz. It uniquely identifies the Large Account and the CLI of the system accessing the SMSC, so there is a one to one relationship between virtual SMSC address and CLI.

Every mobile originated short message is sent to the Large Account through his virtual SMSC address. The final recipient of the message is not evaluated in the SMSC but the message is sent to the CLI directly. In the case of mobile terminated messages the virtual SMSC address shall be transmitted to the MS as SC address.

Further information about the VSMSCs will be distributed on request (refer to [2], the Virtual Short Message Service Centre Concept).

2 Structure of the EMI messages

In the ERMES/UCP-based EMI protocol, the message structure is as follows:

STX Header/Data/Checksum ETX

- stx = 02(hex)
- etx = 03(hex)

Note that in the examples the strings 'stx' and 'etx' each represent only one character. As separator between header and data, between data and checksum, as well as between parameters, a '/' (2F_{hex}) is used. In parameters that contain a list, the items are separated by a ',' (2C_{hex}). Numeric characters (0..F) are encoded as in IA5. Alphanumeric characters are encoded as two numeric IA5 characters, the higher 3 bits (0..7) first, the lower 4 bits (0..F) thereafter.

The Header consists of the following 4 mandatory fields:

Parameter	Type	Description
TRN	2 num. char.	Transaction reference number : Right justified with leading zero.
LEN	5 num. char.	Length Indicator : Total number of IA5 characters contained between stx and etx, right justified with leading zeros.
O/R	Char 'O' or 'R'	Transaction Indicator : 'O' indicates operation, 'R' indicates result
OT	2 num. char.	Operation Type : 01, 31, 51, 52, 53, 55, 56, 57 or 58

The Data fields depend on the Operation Type. For each Operation Type they are listed in the next chapter.

The Checksum is derived by the addition of all bytes of the header, data field separators and data fields (i.e. all characters after the stx-character, up to and including the last '/' before the checksum field). The 8 Least Significant Bits (LSB) of the result are then represented as two printable characters. The character containing the 4 Most Significant Bits (MSB) (of those 8 LSB) shall be transmitted first. For example, if the checksum is 3A_{hex} the representation shall be the characters '3' (33_{hex}) and 'A' (41_{hex}).

Note: If an error occurs in the TRN or O/R-field, no response (ACK/NAK) is returned by the SMSC. The message is then discarded. This is due to the necessity of repeating the TRN or "O/R" in the response of the SMSC, an information that is not there in the first place. If the LEN field is wrong, a syntax error (code '02') is returned.

2.1 Example

Below you will find an example of the Submit Short Message operation (OT 51) and its acknowledgement by the SMSC. The alphanumeric message sent to the subscriber with the MSISDN 01727654321 is "D2 Message". An authentication code for the message is declared and the (generic) originator address is 12345 :

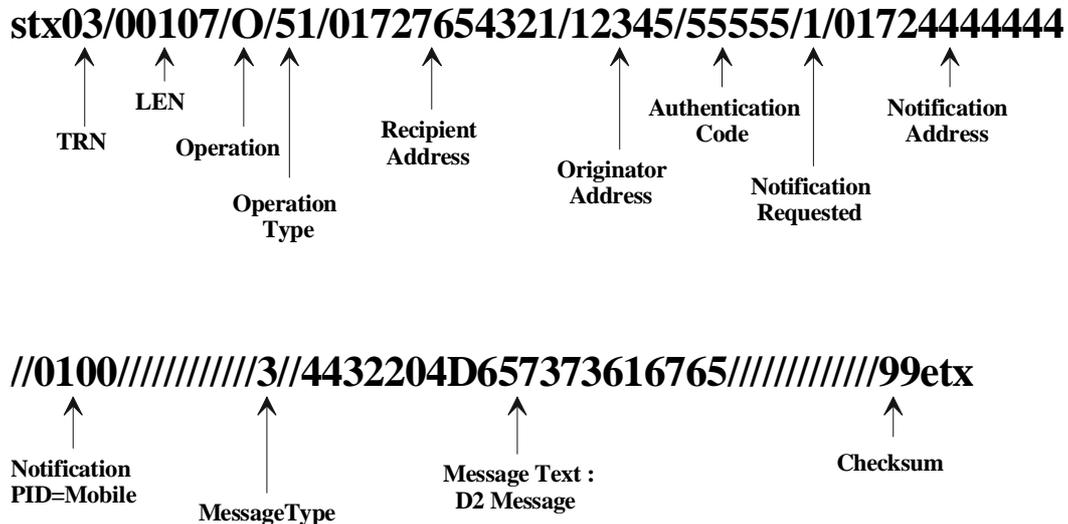


Figure 2.1 Example of a Submit Short Message operation

The Notification requested in the example will be sent to a Mobile Station. This means that after the first delivery attempt, a short message (Notification) shall be generated and sent to the MS with the subscriber number 01724444444. It shall inform the MS about the outcome of the delivery attempt, indicating either a successful delivery, a permanent error cause for non delivery (e. g. the recipient doesn't exist) or a temporary error cause (e. g. subscriber absent, subscriber's SIM full, subscriber's MS not capable of receiving the SM), after which a retry mechanism is started. Let's assume that the recipient has switched off his MS at the time the first delivery is attempted. The 'notification' short message sent to 01724444444 shall inform the MS that the SM has been stored in the SMSC. As soon as the recipient switches his MS on he shall receive the SM, and a second 'notification' short message shall be sent to 01724444444, informing about the successful final delivery. If the recipient doesn't switch his MS on for, e.g. 2 days, the SM shall be deleted in the SMSC. A notification shall then inform the MS '01724444444' about the non-delivery and add a reason code (in this case 'Validity Period expired').

Notifications can also be sent to the application itself. The NPID must then either be left empty, or be set to 0439 (ISDN) or 0339 (X.25). They will be sent as 'delivery notification' (see chapter 4.5.4) and have to be acknowledged. Note that if no notification address (NAd) and Notification PID (NPID) are indicated, notifications shall only be sent during the active session. Furthermore, for notifications sent to users which do not automatically provide their CLI (SMSC accessed via PSTNa and modem) and for which no subscription is possible with the SMSC, notifications shall be sent only during the first active session, during which the message to the MS was submitted (i. e. the SMSC shall never call the application via PSTN/Modem).



Figure 2.2 Example of a Submit Short Message operation ACK

3 EMI operation overview

EMI commands can be initiated either from the Application, or from the SMSC. Each command will be acknowledged, either with an ACK or a NAK.

Please consider in your applications that reserved and unused information fields in UCP messages are subject to changes (with respect to the allowed format described in this specification)!

Please ensure that your applications can handle modifications of this fields due to introduction of new SMS features.

3.1 Application initiated commands

The following Short Message Terminal (SMT) initiated operations are available:

Operation Type	Operation
01	Call input operation ¹
31	SMT alert operation
51	Submit Short Message operation
55	Inquiry Message operation
56	Delete Message operation

¹ for SMS submission it is recommended to use the 51-operations only.

The '*Submit Short Message*' operation (OT-51) is the recommended mean of submitting a short message. Several GSM phase 2 features are taken into account and in future, parameters for new functionalities will be implemented here. The '*SMT Alert*' operation (OT-31) is a mean to trigger a new delivery attempt of messages, buffered in the SMSC, to a particular mobile station or application. The '*Inquiry Message*' (OT-55) and '*Delete Message*' (OT-56) operations enable the user to keep control over messages that were already submitted to the SMSC but are not delivered yet. Those operations are, however, only possible if the connection to the SMSC uses the Calling Line Identification (X.25, ISDN) or authentication codes were associated with the messages. Refer to chapter 4.7 for a detailed functional specification of those commands. Finally, the '*Call Input*' (OT-01) operation is a simple operation type that offers just the basic functionality for submitting a short message. Not all new features will support this operation type in the future.

Note: If the message length of a message submitted to the SMSC exceeds 160 characters it is segmented in the SMSC before being delivered to the MS. *LONG# is added as first characters of the user data in the first messages, *LAST# is added to the last short message. Messages are split in the SMSC at the last 'space' character that appears in a segment of 160 characters. Up to 640 chars can be used as maximum length in the SMSC. This holds true for Operation types 01, 51 and 52.

Transparent messages have a maximum length of 140 bytes. No 'long message' functionality applies here.

Only IA5 characters (Codes 0x00 - 0x7F) are supported for the submission of EMI messages to the SMSC. The characters Ä, Ö, Ü, ä, ö, ü, ß can be submitted using the german national replacement codes (see annex B). In the other direction, however, the SMSC may submit characters whose code exceed 0x7F according to the table in Annex B.

If the SMSC is accessed using the UCP operations (-51, -55, -56) it shall respond with the operations (-53, -57, -58).

If the SMSC is accessed by a CLI session (i. e. via X.25 or ISDN), the SMSC shall include the CLI in the originator field of the SMS-MT if the originator address field OAdC is left empty in the UCP operation. Therefore, the OAdC must contain at least a dummy address, if the CLI is not to be shown to the mobile end user. Note that the OAdC has to be included in the operations 5x.

3.2 SMSC initiated operations

SMSC initiated operations (used to deliver Notifications or Mobile Originated Short Messages) are:

Operation type	Operation
01	Call input operation
52	Delivery short message operation
53	Delivery notification operation
57	Response inquiry operation
58	Response delete message operation

Important Note :

Mobile originated Short Messages are *always* submitted to the LA within the 52-operation type. This is contrary to the past where GSM Phase1 MO-messages were transmitted within OT-01 and messages containing GSM Phase2 parameters within OT-52.

Note: The following alternatives are possible to address the application:

- (i) If the application makes use of the VSMSC/Large Account functionality, a dedicated SMSC address can be used to define it (e. g. a service provider or large customer). The recipient address of the SM-MO shall not be evaluated at all by the SMSC and will be passed through to the application transparently (refer to [2])
- (ii) If the application makes use of the Large Account functionality, the combination of the physical SMSC address and a 'Short Number' as destination address can be used to route the SM to the application. A 'Short Number' is a 3 up to 5 digit sized number which uniquely identifies the Large Account and is a matter of contract between application and Mannesmann Mobilfunk (refer to [2])

4 EMI operations Syntax

This chapter shows the syntax of the *data fields* of the EMI commands. For the syntax of the complete messages, please refer to chapter 2, structure of the EMI message.

For the data field syntax you have to differentiate between the basic commands (OT-01, OT-31) and the extended OT-5x operations. The basic commands have individual data field structures for each command and response. For the 5x-operations a generic Abstract Data Type (ADT) has been introduced. This leads to a higher maintainability in the case of protocol improvements.

4.1 Address syntax

For all addresses used in the EMI-messages the following syntax rules are valid:

The following syntax is seen as valid addresses:

```

0172<Subscriber Number>
or 0049172<Subscriber Number>
or 0173<Subscriber Number>
or 0049173<Subscriber Number>
or 0174<Subscriber Number>
or 0049174<Subscriber Number>
or 0162<Subscriber Number>
or 0049162<Subscriber Number>
or 01520<Subscriber Number>
or 00491520<Subscriber Number>

```

if messages are sent to D2 subscribers

```

or 00<Country Code><National Destination Code><Subscr.Number>
   if messages are exchanged with international mobile subscribers

```

for the recipient addresses.

The Originator should indicate at least a national prefix:

```

00<Country Code><National Destination Code><Subscr. Number>
or 0<National Destination Code><Subscriber Number>;
   e. g. 00492115331544 or 02115331544

```

Prefixes can be omitted if the originator is a D2 mobile subscriber using the asynchronous mobile data services to access the SMSC.

4.2 Parameters used in operations

This section gives an introduction to all the parameters of the data-field used in the EMI operations. They apply as well for the basic commands as for the 5x-operations. If some of the parameters are restricted in their range for one particular command, it is explicitly mentioned in the command description. The general structure of the data-field is describe in chapter 4.5.1

Parameter	X: only res- tricted to LA	Meaning
AdC		Address code recipient for the SM

OAdC	address code originator (numeric)
AC	Authentication code originator; this parameter can be used to mark one message. The AC must used for the inquiry/delete function in no CLI sessions; see chapter 4.7 for more details. The AC has to consist of at least 4 numeric digits.
NRq	Notification Request If set to '1' notification message shall be generated. If the fields NAdC, NT, NPID are left empty, notifications shall be sent to the application during the active session only. No notifications will be sent to the application via PSTNa/modem in a subsequent session.
NAdC	Notification Address If the notif. shall be send to a MS, the NAd is <0172> (or 0173) + <recipient address of the notif.>
NT	Notification type: Buffered Notif.(BN), Delivery Notif.(DN) or Non Delivery Notif (ND) 0 Default 1 DN 2 ND 3 ND+DN 4 BN 5 BN+DN 6 BN+ND 7 BN+DN+ND Default setting is 7 (BN+DN+ND).
NPID	Notification PID value: 0100 Mobile Station 0339 PC appl. over X.25 0439 PC appl. over ISDN
DD	Deferred Delivery Requested 1 DD is requested empty no DD requested
DDT	Deferred Delivery time in DDMMYYhhmm
VP	Validity period in DDMMYYhhmm The maximum validity period is set to 2 days at the moment.
RPID	Relay PID value. Used to transparently pass a PID to a MS. (0064..0071) Refer to annex E i) and [1] for further Information.
SCTS	Service Centre Time Stamp in DDMMYYhhmmss. For a Short Message this is the time stamp of the Short message itself. For a notification this is the time stamp of the Short message to which the notification belongs to.
DSt	Delivery Status: 0 Delivered 1 Buffered (See Rsn.) 2 Not delivered (See Rsn.)
Rsn	Reason code, value "000"... "255" Indicates for what reason a short message was not delivered. Refer to annex C.

DSCTS		Delivery Service Centre Time Stamp in DDMMYYhhmmss. Indicates when the Short Message has been delivered/when a SM delivery attempt takes place.
MT		Message type. Associated parameters depend on the value of the message type: 2 Numeric message 3 Alphanumeric message 4 Transparent message
NB		No. of bits in Transparent Data (TD) message. This field is always left empty (but present) if MT ≠ 4. Transparent data means, that no data conversion from/to SMS alphabet takes place in the SMSC. The user data is transparently passed to/from the mobile station.
Msg		Numeric (NMsg)/alphanumeric (AMsg)/transparent (TMsg) message depending on the message type.
MMS	X	More messages to send to the same SME Values: empty No more messages 1 More messages or notifications from SMSC to come
DCS		Data Coding Scheme (used in OT-52 only) 0 Default Alphabet 1 User defined data (transparent data)
MCI		Message Class Type, if MT=4 and no XSer "GSM DCS information is used (Refer to [3] for further information). 0 Immediate display on the MS. SM may not be stored. 1 Message stored in the mobile. 2 Message stored on the SIM. 3 Message to be sent to terminal equipment.
RPI	X	Reply Path Indication 1 Request 2 Response
PR	X	Priority request 1 Request for priority message empty Normal message A priority message will be delivered before all other messages waiting for one subscriber in his recipient address queue. This feature is only available for Large Accounts and is a matter of contract.
OTOA	X	Originator Type Of Set this field to '1139' if the OAdC should be set to NPI telephone and TON international. Leave empty when this is not requested.

XSer	restricted for LA in OT-52	<p>Extra Services</p> <p>With the XSer field one or more additional services can be specified. These services consist of IA5 encoded data constructed in the following common format: TTLDD... where</p> <p>TT = 01; with this service type GSM UDH information can be specified</p> <p>TT = 02; with this service type GSM DCS information can be specified</p> <p>TT = 00 is not used, and 03..FF are reserved</p> <p>LL represents two HEX characters defining the number of octets present in the data field DD. (Note that the number of <i>HEX characters</i> in the data DD is twice the number of <i>octets</i>)</p> <p>DD represents a stream of HEX characters defining the service specific data itself.</p> <p>If more than one additional service is to be specified in one message, this service information is concatenated without any separators, i.e. TT₁LL₁DD₁...DD₁TT₂LL₂DD₂..DD₂</p> <p>This feature is only available for Large Accounts and is a matter of contract. Refer to annex E ii) /iii) for further information's</p>
-------------	-------------------------------	---

4.3 Parameters used in responses

This section gives an introduction to all the parameters used in the EMI responses. That means all messages sent from/to the SMSC indicate the acceptance of a command with an acknowledge message (ACK) or the rejection of an invalid command with a negative acknowledgement message (NAK). They apply as well for the basic commands as for the 5x-operations. If some of the parameters are restricted in their range for one particular command, it is explicitly mentioned in the command description

Parameter	Meaning
ACK	Positive acknowledgement: Char "A" Indicator for an acknowledgement.
NAK	Negative acknowledgement: Char "N" Indicator for a negative acknowledgement.
EC	Error Code The list of all error codes can be found in annex A.
SM	System message A description of the SM parameter is given below.
MVP	Modified validity period Returns the maximum allowed validity period if the requested VP exceeds the maximum allowed VP.

The SM parameter contains the following three fields :

Parameter	Meaning
AdC	Address code recipient
SEP	Separator Char ':'
SCTS	Service Centre time-stamp in DDMMYYhhmmss

Note: If the response is a NAK so the **SM parameter** could also contain the error description (optional), e.g. stx05/00035/R/51/N/02/ **Syntax error**/FFetx

4.4 Basic operations

4.4.1 Call input operations (OT-01)

This message can be used to submit an alphanumeric or numeric message to the SMSC. Please take note of the fact that we recommend to make use of the 51-operations instead. The functionality of the 01-operations will *not* be extended with further GSM Phase2 features in the future. The following list shows the parameters in the operation data field :

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
OAdC	O	Address code originator
n.a.	-	not applied (but present)
MT	M	Message type (only MT 2/3 supported)
MSG	O	Numeric/alphanumeric message

Call input operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
SM	O	System message

Call input operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error code
SM	O	System message

The error codes can be found in annex A.

Example

of a **call input operation**, the alphanumeric message is: 'Test':

stx01/00044/O/01/0172123456/2323//3/54657374/55etx

The call input operation **positive result** of this message is:

stx13/00042/R/01/A/0172123456:091198080245/10ext

of a call input operation **negativ result** of a message with a (faulty) message type (MT=1) is:

stx06/00059/O/01/N/23/ Message type not supported by system/0Eetx

4.4.2 SMT alert operation (OT-31)

The SMT alert operation can be used by a SMT to alert the SC. This leads to a new delivery attempt, independent from the current retry schedule. That can be done not just for the own LA, but for any recipient by indicating the AdC in combination with an appropriate PID in the command. The following list shows the parameters in the operation data field :

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
PID	M	compare NPID

SMT alert operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
SM	O	all four digits are zero

SMT alert operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error code
SM	O	System message

The error codes can be found in annex A.

Example

of a **SMT alert operation** to the mobile subscriber 0172123456:

stx23/00032/O/31/0172123456/0100/E7etx

The SMT alert operation **positive result** of this message is:

stx23/00023/O/31/A/0000/28etx

4.5 Extended operations

This chapter introduces the extended UCP operations. The following table gives an overview about the available operation types :

Message	UCP operation	Name
SUBS	51	Submit_short_message
DELS	52	Delivery_short_message
DELN	53	Delivery_notification
INQM	55	Inquiry_message
DELM	56	Delete_message
RINQ	57	Response_inquiry_message
RDEL	58	Response_delete_message

These extended operation types have been introduced in order to provide more facilities to the SMSC users.

To new implementations it is advised to use the operations defined in this chapter if they want to make use of the extended features such as transparent data transfer, inquiry and deletion, replacement of obsolete messages etc.

Implementations based on the Abstract Data Types introduced in this chapter will be easily adaptable to extensions of the protocol due to new GSM features.

4.5.1 Abstract Data Types

This chapter describe the structure of the data-field. For a higher maintainability a new generic Abstract Data Type (ADT) is introduced for all these new UCP operations. ***All 5x series UCP strings including responses contain all fields listed, fields not appropriate are left empty.***

The following table shows the type of data for each member of the generic ADT.

Member	Max. Length	Type
AdC	16	String of numeric char
OAdC	16	String of numeric char
AC	16	String of numeric char
NRq	1	1 numeric char
NAdC	16	String of numeric char
NT	1	1 numeric char
NPID	4	4 numeric char
n.a.	x	String of char
n.a.	x	String of char
n.a.	x	String of char
DD	1	1 numeric char
DDT	10	10 numeric char
VP	10	10 numeric char
RPID	4	4 numeric char
SCTS	12	12 numeric char
DSt	1	1 numeric char
Rsn	3	3 numeric char
DSCTS	12	12 numeric char
MT	1	1 numeric char

NB	4	max 4 numeric char
AMsg ¹	640	String of alphanumeric char
TMsg ¹	140	String of alphanumeric char
NMsg ¹	640	String of alphanumeric char
MMS	1	1 numeric char
PR	1	1 numeric char
DCS	1	1 numeric char
MCI	1	1 numeric char
RPI	1	1 numeric char
n.a.	x	String of char
n.a.	x	String of char
OTOA	4	String numeric char
n.a.	x	String of char
XSer	400	String of char
RES4	x	String of char
RES5	x	String of char

¹Only one message contents field is present in the UCP string depending on the message type (MT).

All reserved (RES) or not applied (n.a.) fields must be present in the UCP string *but* shall remain empty.

A generic ADT for the UCP response is defined as follows :

For a positive response:

Member	Type
ACK	Positive Acknowledgement
MVP	Modified Validity Period
SM	System Message

Note: The MVP field is always present in the responses to the 5x operations. It is only used in the ACK for operation 51. The application should leave this field empty.

For a negative response:

Member	Type
NAK	Negative Acknowledgement
EC	Error Code
SM	System Message

The advantage of using the generic ADT for all extended UCP operations is that one standard UCP string can be used for all operations. The UCP string is build as defined in chapter 2.

The data field always contains ALL fields listed in the 5x series generic ADT. These fields are separated by a '/'. If one member of the ADT is not used in a specific message type, its place in the data string is empty but the field separators will be present in the UCP string (see examples).

This format provides a high degree of flexibility as well as upwards compatibility to future UCP operations.

This does also apply for the responses. For example the positive response message contains the MVP field. This field is only used for the SUBS message positive response, in all other cases this field is left empty, but it does exist. Of course, non 5x operations are still acknowledged the usual way.

4.5.2 Submit short message operation (OT-51)

This message is used to submit a short message to the SMSC. It also supports the additional features :

Notification request	Authentication code
Deferred delivery	Validity period
Replace short message	Message classes
Binary messages	Transparent PID
Priority messages	Reply Path
Originator Type Of Address	User Data Header information

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
OAdC	M	Address code originator
AC	O	Authentication code originator
NRq	O	Notification requested
NAdC	O	Notification address
NT	O	Notification type
NPID	O	Notification interworking type
DD	O	Deferred delivery requested
DDT	O	Deferred delivery time
VP	O	Validity period
RPID	O	Relay PID
MT	M	Message type
NB	M	Number of bits (just for transparent message with MT=4)
MSG	O	Numeric/alphanumeric/transparent message
PR	O	Priority request
MCI	O, (M)	Message class. Shall be supplied when MT=4 and XSer "GSM DCS information" is <u>not</u> supplied (so mandatory for transparent message)
RPI	O	Reply path indication
OTOA	O	Originator Type Of Address
XSer	O	Extra Service

Note: Inquire and Delete operations on a message that has a OTOA content are not possible.

Submit short message operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	Modified validity period
SM	O	System message

Note: The MVP field shall return the maximum allowed validity period if the requested VP exceeded the maximum allowed VP.

Submit short message operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error code
SM	O	System message

The error codes can be found in annex A.

Examples

- 1.) of a **submit short message operation** with a notification request that will be sent to an other mobile subscriber 0172223322 only if the message is delivered; the Text Message is 'SD2 Message':

```
stx00/00104/O/51/0172123456/111111//1/0172223322/0/0100//////////
///3//5E4432204D657373616765//////////E6etx
```

The submit short message operation **positive result** of this message is:

```
stx14/00043/R/51/A//0172123456:091198081547/4Cetx
```

- 2.) of a **submit short message operation** with a deferred delivery requested (DD=1) at the time 05.11.98 10.22 h. A notification request will be sent to a PC application over ISDN only if the message is buffered in the SMSC; the Text Message is 'Switched-Off-MS':

```
stx12/00121/O/51/0172223322/5555//1/0212123456/4/0439////1/0511981022///
///3//53776974636865642D4F66662D4D53//////////ADetx
```

- 3.) of a **submit short message operation** with a deferred delivery requested at the time 06.11.98 10.45 h and a faulty (the VP-Time is of recent time than the DD-Time) validity period at 06.11.98 10.43 h; the message is 'VALIDITY':

```
stx36/00101/O/51/0172123456/1111//////////1/0611981045/0611981043////////3/
/56414C4944495459//////////66etx
```

The submit short message operation **negativ result** of this message is:

```
stx36/00059/R/51/N/22/ Not accepted - Invalid delivery time/4Betx
```

4.) of **submit short message operation** with transparent Message which is 160 octet long (> 140 oct. (!)). Therefore two Message must be send to the Mobile (the Messages are stored in the mobile -> MCI = 1). To mark the messages as concatenated the XSer field must be use:

```
stx00/00356/O/51/0173223322/223344//1//////////4/1080/1234567890123456
789012345678901234567890123456789012345678901234567890123456789
012345678901234567890123456789012345678901234567890123456789012
345678901234567890123456789012345678901234567890123456789012345
678901234567890123456789012345678901234567890123456789012345678
90///1////////01050400220201///78etx
```

```
stx00/00136/O/51/0173223322/223344//1//////////4/0200/1234567890123456
7890123456789012345678901234567890///1////////01050400220202///50etx
```

Note: The XSer field has the value '01050400220202', whereas the third to last octet '0105**0400220202**' mark that a UDH is use; e.g. 00 mark it as concatenated and 22 is the conc. SM reference number.

More details can be found in annex E ii) and iii)

4.5.3 Delivery short message operation (OT-52)

This message (DELS) contains the information for a delivery attempt of a short message. A DELS operation is sent from the SMSC to the SME.

This UCP message is only restricted to Large Accounts.

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
OAdC	M	Address code originator
RPID	M	Relay Protocol Identifier
SCTS	M	Service Centre Time Stamp
MT	M	Message type
NB	O	Number of bits (just for transparent message with MT=4)
MSG	O	Numeric/alphanumeric/transparent message
MMS	O	More messages to send
DCS	O	Data coding scheme
MCI	O	Message class (mandatory for transparent message)
RPI	O	Reply path indication
XSer¹⁾	O	Extra Service

¹⁾ In case that **no** User Data Header message is submit to a LA, it could be that the value of this field is '0000'. More details can be found in annex E ii) and iii)

Delivery short message operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	n.a.
SM	O	System message

Note that the empty MVP field is present.

Delivery short message operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error Code
SM	O	System message

The error codes can be found in annex A.

Examples

of a **delivery short message**. The alphanumeric message 'Test OT-52' is received from originator 0172123456:

```
stx40/00105/O/52/003333/0172123456//////////0000/061198112237////3/
/54657374204F542D203532//////////31etx
```

The delivery short message **positive result** of this message is:

stx17/00039/R/52/A//003333:061198112224/72etx

Of a **delivery short message**. It is used a User Data Header Message, therefore the XSer field contains some octets.

**stx02/00377/O/52/0211591750/01726813735//////////0000/290799101514////
4/1024/3000000568616C6C6F0201000481C01000000000001C00000000
0007E0007200000000003C1001C10000000001E010FE03E00000001F00
BFF8FF8000000F00007FFDFFC00000080000FEDFFDC000000602A0F7FE
FCE0000001FD41E7FF7EE00000000601CFFF7EE00000007801CFFF3FE0
000004001CFFFBFE0000000305///1/1////////010C0B0504158A00000003030
301///5Fetx**

The value in the XSer field '010C0B0504158A00000003030301' mark the first message of overall three concatenated short messages and a application port addressing scheme 16 bit.

4.5.4 Delivery notification operation (OT-53)

This message (DELN) is sent from the SMSC to the SME and contains the information concerning the delivery of a short message. Indeed, the notification has now its own specific operation code.

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
OAdC	M	Address code originator
SCTS	M	Service Centre Time Stamp
DSt	M	Delivery Status
Rsn	M	Reason Code
DSCTS	M	Delivery Service Centre Time Stamp
MT	M	Message Type (always 3)
AMsg	O	Alphanumeric message
MMS	O	More messages to send

Notifications may be sent whenever a state transition buffered/delivered/deleted takes place for a submitted message. Notifications shall not be sent if two subsequent delivery attempts return different error messages which both lead to the buffering of messages.

Delivery notification operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	n.a.
SM	O	System message

Note that the empty MVP field is present (see last section of 4.5.1).

Delivery notification operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error Code
SM	O	System message

The error codes can be found in annex A.

Example

of the **delivery notification operation** which belongs to the notif. req. in chapter 4.5.2, example 2.):

```
stx12/00376/O/53/0211123456/0172223322//////////051198101841/1/107/05119810
2200/3//4E616368726963687420667565722030313732363831333733352C2049646
56E746966697A696572756E67203938313130353130313834312C20697374206765
73706569636865727420776F7264656E2C20646120456D706661656E67657220766
F727565626572676568656E64206E6963687420657272656963686261722028436F
646520313037292E//////////9Detx
```

This message (AMsg) *‘Nachricht fuer 0172223322, Identifizierung 981105101841, ist gespeichert worden, da Empfaenger voruebergehend nicht erreichbar (Code 107).’* was send to the PC application over ISDN, because the MS was not available so that the submitted short message must be buffered in the SMSC.

The delivery notification operation **positive result** is:

```
stx12/00020/R/53/A//99etx>
```

4.5.5 Inquiry message operation (OT-55)

This message is sent by the SME to the SMSC inquiring about a buffered message.

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
OAdC	M	Address code originator
AC	O	Authentication Code

Note: Refer to chapter 4.7 for a detailed specification of this functionality

Inquiry message operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	n.a.
SM	O	System message

Note that the empty MVP field is present.

Inquiry message operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error Code
SM	O	System message

The error codes can be found in annex A.

Example

of a **inquiry message operation** on recipient 0172123456 from originator 5555:

```
stx49/00063/O/55/0172123456/5555////////////////////////////////////BDetx
```

The inquiry message operation **positive result** is:

```
stx49/00020/O/55/A//A2etx
```

4.5.6 Delete message operation (OT-56)

This message is sent by the PC to the SMSC requesting the deletion of one or more messages which are still buffered. These messages are submitted by the PC destined to a certain recipient.

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
OAdC	M	Address code originator
AC	O	Authentication Code
MT	M	Message type (always 3)
AMsg	O	Alphanumeric message
MMS	O	More messages to send

The alphanumeric message field (AMsg) contains the timestamps of the messages to be deleted. Format YYMMDDhhmmss. Timestamps are separated by spaces.

Note: Be aware that the format of the SCTS in inquiry/delete operations differs from the format used in other commands described before.

Refer to chapter 4.7 for a detailed specification of the inquiry/delete functionality.

Delete message operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	n.a.
SM	O	System message

Note that the empty MVP field is present.

Delete message operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error Code
SM	O	System message

The error codes can be found in annex A.

Example

of a **delete message operation**. The timestamp is: '981106153700'.

```
stx77/00088/O/56/0172223322/2222/3//393831313036313533373030////
////////B3etx
```

The delete message operation **positive result** is:

stx77/00020/O/56/A//A4etx

4.5.7 Response inquiry message operation (OT-57)

The Response inquiry (RINQ) message contains a short message which is the response of the SMSC to an inquiry message. A RINQ is sent by the SMSC to the PC .

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
MT	M	Message type (always 3)
AMsg	O	Alphanumeric message
MMS	O	More messages to send

The alphanumeric message field contains the timestamps (format YYMMDDhhmmss) of the buffered messages for the specified recipient. The format of the message is :

Nachricht für <AdC>, Identifizierung [SCTS1] [SCTS2] [..]

If no messages are buffered in the SMSC for that recipient, the [SCTS] fields are left empty.

Note: Be aware that the format of the SCTS in inquiry/delete operations differs from the format used in other commands described before.

Response inquiry operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	n.a.
SM	O	System message

Note that the empty MVP field is present.

Response inquiry operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error Code
SM	O	System message

The error codes can be found in annex A.

Example

of a **response inquiry message operation** that belongs to the example in Chapter 4.5.5 (OT-55):

```
stx02/00174/O/57/02111234//////////3//4E61636872696368742066756572202030
31373231323334353620C204964656E746966697A696572756E672020393831313
036313330373534//////////94etx
```

The alphanumeric message is:

'Nachricht fuer 0172123456 , Identifizierung 981106130754'.

The response inquiry operation **positive result** of this message is:

stx02/00041/O/57/A//02111234:061198130855/D3etx

4.5.8 Response delete message operation (OT-58)

The Response delete message (RDEL) contains a short message which is the response of the SMSC on a Delete short message (DELS). A RDEL is sent by the SMSC to the PC.

Parameter	Presence	Description/Remarks
AdC	M	Address code recipient
MT	M	Message type (always 3)
AMsg	O	Alphanumeric message
MMS	O	More messages to send

The alphanumeric message field contains the timestamps (format YYMMDDhhmmss) of the deleted messages for the specified recipient. The format of the message is :

Nachricht für <AdC>, Identifizierung [SCTS1] [SCTS2] [...] ist gelöscht worden.

If no messages were deleted in the SMSC for that recipient, the [SCTS] fields are left empty

Note: Be aware that the format of the SCTS in inquiry/delete operations differs from the format used in other commands described before.

Response delete operation (positive result)

The following list shows the parameters in the positive result data field:

Parameter	Presence	Description/Remarks
ACK	M	Positive acknowledgement
MVP	M	n.a.
SM	O	System message

Note that the empty MVP field is present.

Response delete operation (negative result)

The following list shows the parameters in the negative result data field:

Parameter	Presence	Description/Remarks
NAK	M	Negative acknowledgement
EC	M	Error Code
SM	O	System message

The error codes can be found in annex A.

Example

of a **response delete message operation** that belongs to the OT-56:

```
stx09/00220/O/58/02111234//////////3//4E61636872696368742066756572202030
3137323232333332202C204964656E746966697A696572756E672020393831313
03631353332343120206973742067656C6F657363687420776F7264656E2E//////////
/53etx
```

The alphanumeric message is:

'Nachricht fuer 0172223322 , Identifizierung 981106153241 ist geloescht worden.'

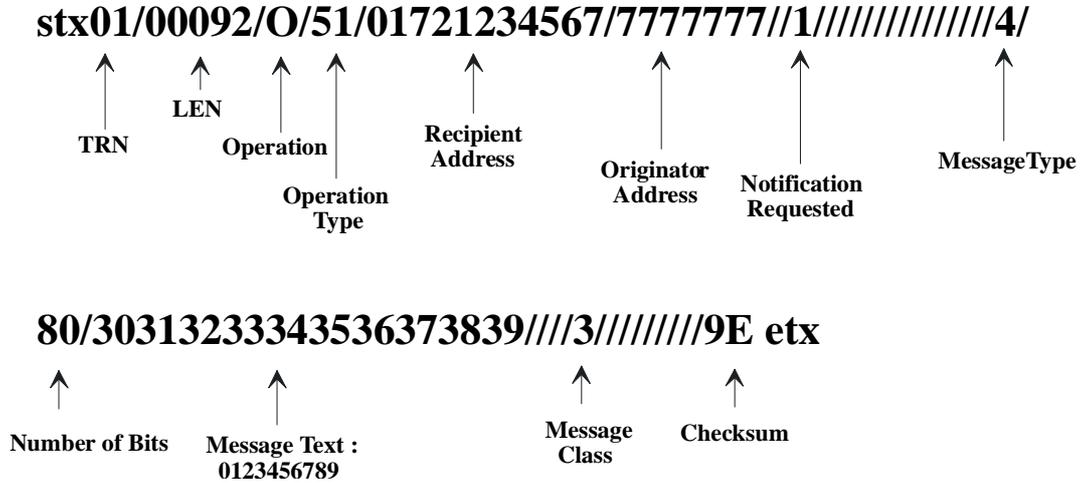
The response delete message operation **positiveresult** of this message is:

stx09/00041/O/58/A/02111234:061198153456/DDetx

4.6 Examples of the extended UCP messages

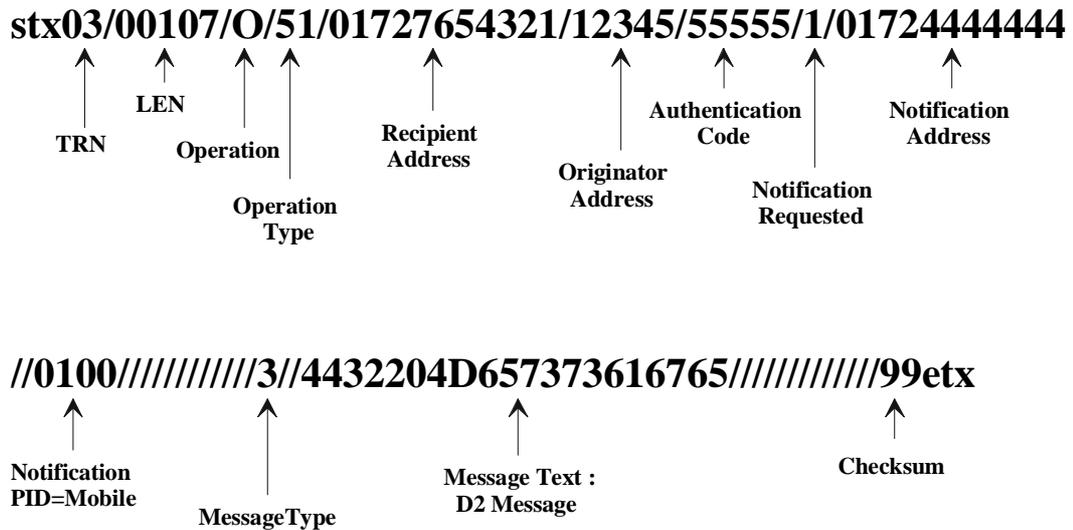
4.6.1 Transparent data message

The following example shows the transmission of a type 51 operation with a notification request and transparent data transfer.



4.6.2 Alphanumeric message

The following example shows the transmission of a type 51 operation with a notification request to a mobile.



4.7 Inquiry and Delete functionality

This chapter gives a complete overview of the specifications on which the implementation of the inquiry/deletion functionality is based. All scenarios described below assume that a message has been submitted to the SMSC via UCP which has been buffered and on which an inquiry/deletion attempt is being performed.

Note: It is assumed in all the scenarios mentioned below that the original message submitted to the SMSC is buffered and the AdC of the original and the inquiry/deletion messages match.

1. Functionality of Inquiry/Delete if CLI available:

The originator of the message shall be identified by the CLI only. Therefore, the following scenarios shall apply:

- a. A message is submitted to a mobile subscriber and buffered in the SMSC. The OAdC field corresponds to the CLI or is left empty (i. e if the OAdC field is left empty, the SMSC shall assume that OAdC=CLI). The AC field is left empty.
In this case, an inquiry/deletion of this message shall be possible from the same CLI only, if the OAdC in the inquiry/deletion message contains the CLI or is left empty.
- b. A message is submitted to a mobile subscriber and buffered in the SMSC. The OAdC field contains an address that is different from the CLI. The AC field is left empty.
The inquiry/deletion of this message shall be possible only if the OAdC, and CLI for the original and the inquiry/delete messages all match. If the OAdC contains a different value or the CLI is different, an inquiry message shall return an empty inquiry notification. Deletion of the original message shall then not be possible.

Note: This behaviour is not in contradiction with 1a. It means that there is no necessary relationship between the CLI and the OAdC. The OAdC may indicate a customer of the CLI-node. Nevertheless, even the external customer should be able to inquire upon/delete messages.

- c. *The AC field is used.* A message inquiry/delete shall be possible only if OAdC, AC and CLI match. If the AC, CLI or OAdC of the original message and the subsequent inquiry/deletion message do not match, an empty inquiry notification shall be returned.

Note: The use of the AC field shall only be possible with operation 51.

2. Functionality of Inquiry/Delete if no CLI available:

- a. If the AC field of the original buffered message is left empty no subsequent inquiry/deletion shall be possible, neither during the session in which the original message was submitted nor during any subsequent session.
- b. No OAdC indicated in the original buffered message, AC present. No inquiry/deletion shall be possible for this message.
- c. OAdC and AC both present in the original buffered message. If the OAdC and the AC of both the original and the inquiry/deletion messages match, inquiry and deletion shall be possible.
If the AC or the OAdC fields don't match an empty inquiry notification message shall be returned.

Annex A

Error Codes Overview

Error codes which can be returned in the operations negative result are listed in ETS 300 133 paragraph 9.2.6. All operations defined in the ERMES standard which are not implemented in the SMSC EMI return with error code 03 ("Operation not supported by system").

6.1 Error codes

01	Checksum error
02	Syntax error
03	Operation not supported by system
04	Operation not allowed (at this point in time)
05	Call barring active
06	AdC invalid
07	Authentication failure
08	Legitimation code for all calls, failure
09	GA not valid
10	Repetition not allowed
11	Legitimation code for repetition, failure
12	Priority call not allowed
13	Legitimation code for priority call, failure
14	Urgent message not allowed
15	Legitimation code for urgent message, failure
16	Reverse charging not allowed
17	Legitimation code for reverse charging, failure
18	Deferred delivery not allowed
19	New AC not valid
20	New legitimation code not valid
21	Standard text not valid
22	Time Period not valid
23	Message type not supported by system
24	Message too long
25	Requested Standard Text not valid
26	Message type not valid for the pager type
27	Message not found in SMSC
30	Subscriber hang-up
31	Fax group not supported
32	Fax message type not supported
33	Address already in list (60 series)
34	Address not in list (60 series)
35	List full (60 series)

Annex B

Character Sets used in the SMSC

Character	SMS Alphabet	MO	MT	Character	SMS Alphabet	MO	MT
@	00	40	40	+	2B	2B	2B
£	01	A3	01	,	2C	2C	2C
\$	02	24	24	-	2D	2D	2D
¥	03	A5	03	.	2E	2E	2E
è	04	E8	04	/	2F	2F	2F
é	05	E9	05	0	30	30	30
ù	06	F9	06	1	31	31	31
ì	07	EC	07	2	32	32	32
ò	08	F2	08	3	33	33	33
Ç	09	C7	09	4	34	34	34
LF	0A	0A	0A	5	35	35	35
Ø	0B	D8	0B	6	36	36	36
ø	0C	F8	0C	7	37	37	37
CR	0D	0D	0D	8	38	38	38
Å	0E	C5	0E	9	39	39	39
å	0F	E5	0F	:	3A	3A	3A
Δ	10	81	10	;	3B	3B	3B
_	11	5F	11	<	3C	3C	3C
Φ	12	82	12	=	3D	3D	3D
Γ	13	83	13	>	3E	3E	3E
Λ	14	84	14	?	3F	3F	3F
Ω	15	85	15	i	40	A1	00
Π	16	86	16	A	41	41	41
Ψ	17	87	17	B	42	42	42
Σ	18	88	18	C	43	43	43
Θ	19	89	19	D	44	44	44
Ξ	1A	8A	1A	E	45	45	45
1)	1B	1B	1B	F	46	46	46
Æ	1C	C6	1C	G	47	47	47
æ	1D	E6	1D	H	48	48	48
β	1E	7E	7E	I	49	49	49
É	1F	C9	1F	J	4A	4A	4A
SP	20	20	20	K	4B	4B	4B
!	21	21	21	L	4C	4C	4C
"	22	22	22	M	4D	4D	4D
#	23	23	23	N	4E	4E	4E
α	24	A4	02	O	4F	4F	4F
%	25	25	25	P	50	50	50
&	26	26	26	Q	51	51	51
'	27	27	27	R	52	52	52
(28	28	28	S	53	53	53
)	29	29	29	T	54	54	54
*	2A	2A	2A	U	55	55	55

Character	SMS Alphabet	MO	MT
V	56	56	56
W	57	57	57
X	58	58	58
Y	59	59	59
Z	5A	5A	5A
Ä	5B	5B	5B
Ö	5C	5C	5C
Ñ	5D	D1	5F
Ü	5E	5D	5D
§	5F	A7	5E
ı	60	BF	60
a	61	61	61
b	62	62	62
c	63	63	63
d	64	64	64
e	65	65	65
f	66	66	66
g	67	67	67
h	68	68	68
i	69	69	69
j	6A	6A	6A
k	6B	6B	6B
l	6C	6C	6C
m	6D	6D	6D
n	6E	6E	6E
o	6F	6F	6F
p	70	70	70
q	71	71	71
r	72	72	72
s	73	73	73
t	74	74	74
u	75	75	75
v	76	76	76
w	77	77	77
x	78	78	78
y	79	79	79
z	7A	7A	7A
ä	7B	7B	7B
ö	7C	7C	7C
ñ	7D	F1	1E
ü	7E	7D	7D
à	7F	E0	7F

Notes: The SMS-Alphabet is defined in the GSM recommendation 03.38 [3].

The character marked "1)" is not used alone (only in combination with 'e'; see below) but is displayed as a space.

The column MO indicates the character mapping from GSM-alphabet to ISO8859-1 (value that is received by a PC via UCP corresponding to a character in a mobile originated Short Message). The inexistent characters Δ, Φ, Γ, Λ, Ω, Π, Ψ, Σ, Θ and Ξ, are coded Hex 81 through Hex 88, respectively.

The column MT indicates the character mapping from ISO8859-1 to GSM-alphabet (value that has to be submitted via UCP towards the SMSC). Characters that do not exist in ISO8859-1 have been mapped as likely as possible according to the GSM-alphabet.

Only IA5 characters coded Hex 00 to Hex 7F shall be accepted by the SMSC in the user data of UCP operations 01 and 51 whereas characters coded up to Hex FF may be submitted to the external application according to this table.

The SMSC uses the German National Replacement Codes (NRCs, s. ISO 21 German) for the representation of the characters ä, Ä, ö, Ö, ü, Ü, ß, §. They can be submitted to the UCP using the following codes:

Char	Code	ASCII
Ä	5B	[
Ö	5C	\
Ü	5D]
ä	7B	{
ö	7C	
ü	7D	}
ß	7E	~
§	5E	^

To use the EURO currency symbol '€' there must submit the following two characters: '1B 65'. A Euro that is sent to a PC via UCP has the same value.

A receiving entity which is incapable of displaying the EURO symbol will mostly display the character 'space' plus 'e' instead.

Character Coding may be subject to changes.

Annex C**Reason codes with the error messages reported in notifications**

0x01, 0d001, Nachricht ausgeliefert
 0x02, 0d002, T, voruebergehend kein Service
 0x03, 0d003, T, voruebergehend kein Service
 0x04, 0d004, T, voruebergehend kein Service
 0x05, 0d005, T, voruebergehend kein Service
 0x06, 0d006, T, voruebergehend kein Service
 0x07, 0d007, T, voruebergehend kein Service
 0x09, 0d008, T, unbekannter Fehler
 0x0A, 0d009, T, Netzwerk Timeout
 0x32, 0d050, T, Speicherzeit abgelaufen
 0x64, 0d100, P, Dienst nicht unterstuetzt
 0x65, 0d101, P, Empfaenger unbekannt
 0x66, 0d102, P, Dienst nicht verfuegbar
 0x67, 0d103, T, Anrufsperrung
 0x68, 0d104, T, Operation gesperrt
 0x69, 0d105, T, Service Center ueberlastet
 0x6A, 0d106, P, Dienst nicht unterstuetzt
 0x6B, 0d107, T, Empfaenger voruebergehend nicht erreichbar
 0x6C, 0d108, P, Auslieferungsfehler
 0x6D, 0d109, T, kein freier Speicher beim Empfaenger
 0x6E, 0d110, T, Protokollfehler
 0x6F, 0d111, T, Mobiltelefon des Empfaengers ohne SMS
 0x70, 0d112, P, Unbekanntes Service Center
 0x71, 0d113, T, Service Center ueberlastet
 0x72, 0d114, P, Illegales Mobiltelefon des Empfaengers
 0x73, 0d115, T, Empfaenger kein D2-Kunde
 0x74, 0d116, T, Fehler im Mobiltelefon des Empfaengers
 0x75, 0d117, T, untere Protokollschicht fuer SMS nicht verfuegbar
 0x76, 0d118, T, Systemfehler
 0x77, 0d119, T, PLMN Systemfehler
 0x78, 0d120, T, HLR Systemfehler
 0x79, 0d121, T, VLR Systemfehler
 0x7A, 0d122, T, Vorangegangener VLR Systemfehler
 0x7B, 0d123, T, Fehler beim Ausliefern (Nummer pruefen!)
 0x7C, 0d124, T, VMSC Systemfehler
 0x7D, 0d125, T, EIR Systemfehler
 0x7E, 0d126, T, Systemfehler
 0x7F, 0d127, T, Unerwartete Daten
 0x82, 0d130, T, SMS Empfang gesperrt (Subscriber barring service)
 0x83, 0d131, P, SMS Empfang gesperrt (Operator barring)
 0xC8, 0d200, T, Fehler bei der Adressierung des Service Centers
 0xC9, 0d201, T, Ungueltige absolute Speicherzeit
 0xCA, 0d202, T, Nachricht groesser als Maximum
 0xCB, 0d203, T, GSM-Nachricht kann nicht ausgepackt werden
 0xCC, 0d204, T, Uebersetzung in IA5 ALPHABET nicht mglich
 0xCD, 0d205, T, Ungueltiges Format der Speicherzeit
 0xCE, 0d206, T, Ungueltige Empfaengeradresse
 0xCF, 0d207, T, Nachricht zweimal gesendet
 0xD0, 0d208, T, Ungueltiger Nachrichtentyp

T = temporary error, retry schedule applies

P = permanent error, short message discarded

Annex D

Contents of Control messages

The contents of the notification messages are the following:

Nachricht fuer <Empfänger Nummer>, Identifizierung <Identifizierung>, ist gespeichert worden, da <Fehlermeldung> (Code <Code>).

for temporary errors,

Nachricht fuer <Empfänger Nummer>, Identifizierung <Identifizierung> konnte nicht ausgeliefert werden, da <Fehlermeldung> (Code <Code>).

for permanent errors, and

Nachricht fuer <Empfänger Nummer>, Identifizierung <Identifizierung>, ist am <Datum> um <Uhrzeit> ausgeliefert worden.

for successful message deliveries.

The contents of inquiry response messages have the following syntax:

Nachricht fuer <Empfänger Nummer>, Identifizierung <Identifizierung>

<Identifizierung> is left empty when there are no messages buffered for the recipient in the SMSC.

The contents of deletion response messages have the following syntax:

Nachricht fuer <Empfänger Nummer>, Identifizierung <Identifizierung> ist gelöscht worden.

<Identifizierung> is left empty when no message has been deleted for the recipient in the SMSC.

Annex E

Explanation of the RPID field and Extra Service XSer field

i) Relay Protokol-Identifier RPID

RPID code	RPID meaning	Explanation
0064	Short Message Type 0	This Type indicates that the ME must acknowledge receipt of the short message but may discard its contents
0065...0071	Replace Short Message Type 1 to Type 7 ¹⁾	If one of these Types are present, then the MS will check the associated SC address and originating address and replace any existing stored messages having the same PID code, SC addr. and orig. addr. with the new short message and other parameter values. If there is no message to be replaced or if one of these codes is not present, then the MS shall store the message in the normal way.

¹⁾ This feature is optional for the ME and the SIM.

ii) Extra Service XSer - Type of service TT=01, GSM UDH information

With this service type *GSM User Data Header information* can be specified. The data field DD of this service type has the structure and contains the octets (in hex) as follows:

UDHL Length of User Data Header, 1 oct.

IEIa Information-Element-Identifier "A", 1 oct.:

00 Concatenated short message

01..02 n.a.

03 value not used avoid misinterpretation as <LF> character

04..05 Application port addressing scheme 8 or 16 bit address, Mobile specific

06..FF reserved for further use

IEIDLa Length of Information-Element Data "A", 1 oct.

IEIDa Information-Element Data "A", 1..n oct.

IEIb Information-Element-Identifier "B", 1 oct.:

see above

IEIDLb Length of Information-Element Data "B", 1 oct.

IEIDb Information-Element Data "B"

IEIn Information-Element-Identifier "n", 1 oct.:

see above

IEIDLn Length of Information-Element Data "n", 1 oct.

IEIDn Information-Element Data "n"

If the IEIx is used for concatenated short message then the appropriate Information Element Data octets shall be coded as follows.

Octet 1 Concatenated short message reference number

This octet shall contain a modulo 256 counter indicating the reference number for a particular concatenated short message. This reference number shall remain constant for every short message which makes up a particular concatenated short message.

- Octet 2 Maximum number of short messages in the concatenated short message.
This octet shall contain a value in the range 0 to 255 indicating the total number of short messages within the concatenated short message. The value shall start at 1 and remain constant for every short message which makes up the concatenated short message. If the value is zero then the receiving entity shall ignore the whole Information Element.
- Octet 3 Sequence number of the current short message.
This octet shall contain a value in the range 0 to 255 indicating the sequence number of a particular short message within the concatenated short message. The value shall start at 1 and increment by one for every short message sent within the concatenated short message. If the value is zero or the value is greater than the value in octet 2 then the receiving entity shall ignore the whole Information Element

Every UDH octet is encoded in two IA5 hex characters, as usual in UCP. An example is given below.

The length of the UDH information, related to the length of the Msg field content, is restricted to the maximum length of the GSM TP-UD field: 140 octets c.q. 160 septets.

Depending on the MT field this is checked as follows:

- If MT = 2 or 3 then: The length of the UDH field (in octets), multiplied by 8/7, rounded up to the nearest integer value, plus the length of the NMsg/AMsg field (in octets) must not exceed 160 (septets).
- If MT = 4 then: The length of the UDH field (in octets) plus the length of the TMsg field (in octets) must not exceed 140 (octets).

There must be only one occurrence of *Type of service 01, GSM UDH information* in XSer.

Example encoding of XSer Type of service **01**, GSM UDH information:

A GSM UDH consisting of the following two UDH information elements is to be encoded:

1. Concatenated short messages, Concatenated short message reference number = 64, Maximum number of short messages in the concatenated short message = 4, Sequence number of the current short message = 2
2. Application Port Addressing 8 bit address, destination port = 240, originator port = 250

TTLDD.. encoding in IA5 characters: 010A0900034004020402F0FA

This same TTLDD... encoding annotated:

01 = TT, specifies XSer Type of service 01, GSM UDH information

0A = LL, specifies that DD part contains 10 octets

09 = DD, UDHL, Length of user data header = 9 octets

00 = DD, IEIa, Information-Element-Identifier a, Concatenated short messages

03 = DD, IEIDLa, Length of information element a = 3 octets

40 = DD, IEDa, Concatenated short message reference number = 64

04 = DD, IEDa, Max number of short messages in the concatenated message = 4

02 = DD, IEDa, Sequence number of the current short message = 2

04 = DD, IEIb, Information-Element-Identifier b, Application Port Addressing 8 bit

02 = DD, IEIDLb, Length of information element b = 2 octets

F0 = DD, IEDb, destination port = 240

FA = DD, IEDb, originator port = 250

iii) XSer Type of service 02, GSM DCS information

The type of service always has a total length of 6 numeric characters. So the sequence TTLLDD is set to:

TT = 02

LL = 01

DD = 00..FF.

The meaning of the DCS values are explained in GSM 03.38.

Use the GSM DCS information field to send UCS2 coded short messages. The MT field must be set to the value 4.

Use the GSM DCS information field to send 8-bit data coded short messages. The MT field must be set to the value 4. If the GSM DCS information field is not specified, MT=4 indicates an 8-bit coded short message and the MCLs (Message Class) must be specified.

Use the GSM DCS information field to send "Message Waiting Indication" updates to the mobile station.

Use the GSM DCS information field to send "Message Class Meaning". If the MCLs field is specified too, the GSM DCS information field overrules the MCLs field.

The use of the GSM DCS information field in the XSER field is limited to the UCP 51 and UCP 52 messages.

Example encoding of XSer Type of service **02**, GSM DCS information:

020100, meaning that the DCS value 00 (0000 0000 binary) is used.

According to the GSM03.38 specification, this means 7-bit default alphabet, no compression, no message class meaning.

The following example show how **both examples** of Type of service **01** and **02** are working together if they should be submitted in OT-51 or delivered in OT-52:

...\010A0900034004020402F0FA**02**0100\...

Annex F

SMSC Modem settings

You may use the following settings for your modem:

Baud rate: 2400 .. 14400 Bit/s

Standard settings: 8 data bits, no parity, 1 stop bit

Error-Control MNP4 or V.42 (LAPM) must be used.

Example to configure the error-control MNP4:

- MicroLink 28.8: activate: **AT+MNP4** (&W store setup)
- ZyxEL V.34: activate: AT+K1 or AT+K2

These are the complete SMSC modem settings

NOKIA ECM FAST Software release : BA Active Setup : 1

S0 Rings to answ 1	*W Protection	!T Terminal rate 5
S2 <ESC> char... 128	A Online Answer	&C DCD options 1
S3 <CR> char... 13	B Answ tone.... 2	&D DTR options.. 2
S4 <LF> char... 10	E Cmd echo..... ON	&F Load preset
S5 <BS> char... 8	F Line rate.... 0	&G Guard tone... 0
S6 Wait dialtone 10	H Hook ctrl	&L Line type.... 0
S7 Wait carrier. 60	I Info query	&M Command set 0
S8 Pause time... 2	L Loudspeaker vol 2	&S DSR options 1
S10 Disconn time. 28	M Speaker control 0	&T Response to RL ON
S12 <ESC> time... 50	O Online Orig..	&T Use of 140/141 OFF
S17 Inact timeout 0	Q Result codes ON	&W Store setup
S18 Test timer... 0	V Result form.. 1	&X Sync clock... 0
S25 DTR delay.... 5	X Result set... 4	&Z Store number
S26 CTS delay.... 1	Z Restore setup	\F Disp cmd dir
*C Call back 0	!B Dial back up. 0	\K Break ctrl... 1
*D Prefix	!D Rate deviation 0	\N Error ctrl... 3
*F Handshake opt. 3	!F LL- rate 7	\Q Flow control 2
*M Call back mess.	!H Answ/orig sel. 2	\V CONNECT res.. 4
*P D asy chr frm 0	!M Max line rate 7	%A Async char... 13
*R Redialling 0	!N Retrain 2	%C Compression.. OFF
*Y Call back del 20	!P Parity 4	

Annex G

Contact persons

Further technical information can be obtained by

Thomas Ackermann, Minh Tam Lien or Dr. Sabine Wiemann

Fax : +49 211 533-3804

E-mail : minh.lien@d2vodafone.de
thomas.ackermann@d2vodafone.de
sabine.wiemann@d2vodafone.de

D2 Vodafone
Am Seestern 1
40543 Düsseldorf

If you have questions about commercial issues, contracts etc. please refer to

Gerald Lasinski

Fax : +49 211 533-1876

E-mail : gerald.lasinski@d2vodafone.de

D2 Vodafone
Am Seestern 1
40543 Düsseldorf

Updates of this document and informations concerning the Short Message Service can be retrieved from our Internet-Website :

<http://www.d2vodafone.de>

Annex H**Revision marks**

Chapter	Description of modification [EMI V1.0 -> EMI V1.1]
0	new cover sheet
Preface	Revision numbers of references updated
1.1	It is pointed out that just transparent X.75 shall be used to communicate with the SMSC
2.1	There was an error in the second example of a UCP-string. An 'R' for 'response' had to be inserted in the message instead of 'O' for 'operation'
4.5.2	It was pointed out that MCI is a mandatory field for MT=4
4.5.3	It was pointed out that MCI is a mandatory field for MT=4
Annex B	The character set tables within the SMSC have been improved. They have been corrected for one character ('_') in the MO direction and several characters have been added for the MT case (special characters, Greek characters etc.).

Chapter	Description of modification [EMI V1.1 -> EMI V2.0]
-	Editorial modifications and clarifications
0	Revision of references
3.2	Additional information 'Short numbering'
4.2 / 4.5.1 / 4.5.2	Introduction of Priority parameter (PR)

The following section shall give a short indication about changes in the D2 network or in the SMSC behaviour that might have relevant impact on SMS applications.

Changes since [EMI V1.1 -> EMI V2.0]

The SMSC now supports true FIFO (First-in-first-out) delivery. No message will be received by the mobile in advance to an older message.
FIFO delivery can be bypassed by using priority messages (refer to chapter 4.5.2).

The MMS (More messages to send) bit in the SMS TPDU will now be used according to [1].
If more messages are waiting to be delivered to a mobile subscriber originated by a particular Service Centre Address the MMS bit is used to indicate this.

The SMSC now supports the Phase 2 Status Report (refer to [1] for more detailed information). This gives a mean to the user to request notifications even for binary mobile originated messages.

For mobile->mobile Short Messages the TP-UDHI field is now accepted by the SMSC and passed through transparently.

Chapter	Description of modification [EMI V2.0 -> EMI V2.1]
4.2	New and different number area of the PID value; New XSer field
4.4 and 4.5	examples for every operation type
4.5.1 and 4.5.2	New XSer field
new annex E	Detailed explanation of the Relay-Protokoll-Identifier RPID; detailed explanation to the Extra Service field XSer; old annex E -> annex F, old annex F -> annex G, old annex G -> annex H
annex G	New contact persons

Chapter	Description of modification [EMI V2.1 -> EMI V2.1.1]
4.5.4	correction of the example

Chapter	Description of modification [EMI V2.1.1 -> EMI V2.1.2]
4.2	change of the restriction of the XSer field
4.5.3	add Xser field and a new example
annex E ii	some correction

Chapter	Description of modification [EMI V2.1.2 -> EMI V2.1.3]
4.2, 4.5.1 and 4.5.2	new OTOA field
annex B	using of the EURO currency symbol '€'
annex C	two new reason codes (0x82, 0x83)
annex G	new contact person

Chapter	Description of modification [EMI V2.1.3 -> EMI V2.1.4]
1.1	some corrections
4.1	correction in address syntax
annex C	correction: 0x83 T->P
annex F	using of error-control MNP
annex G	new contact person; new web-address

Chapter	Description of modification [EMI V2.1.4 -> EMI V2.1.5]
1.3	new PSTN access number

Chapter	Description of modification [EMI V2.1.5 -> EMI V2.2]
1.3	new access number
1.5	BL/WL list management can no longer performed by LA itself
4.1	additional prefix in address syntax XSer
4.5.2	MCIs optional
annex E iii)	detailed explanation to the Extra Service field XSer "GSM DCS information"
annex G	new contact person, new Web-address