**3GPP TSG-T (Terminals) Meeting #13**
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**Agenda Item:** 5.2.3

**Source:** T2

**Title:** 27.005 CR on Conversion of GSM to 3GPP references

**Document for:** Approval

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| Spec | CR | Rev | Rel | Subject | Cat | Vers-Curr | Vers-New | T2 Tdoc | Workitem |
|---|---|---|---|---|---|---|---|---|---|
| 27.005 | 002 | 1 | Rel-4 | Conversion of GSM to 3GPP references | F | 4.0.0 | 4.1.0 | | TEI4 |

**3GPP TSG-T2 #14**
**Edinburgh, Scotland**
**3-7 September 2001**

*CR-Form-v4*

# CHANGE REQUEST

⌘ **27.005** **CR** **002** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Conversion of GSM to 3GPP references |
| ***Source:*** | ⌘ | T2 |
| ***Work item code:*** | ⌘ | TEI4 |
| ***Date:*** | ⌘ | 31/08/2001 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | REL-4 |

*Use one of the following categories:*
***F*** *(correction)*
***A*** *(corresponds to a correction in an earlier release)*
***B*** *(addition of feature),*
***C*** *(functional modification of feature)*
***D*** *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

*Use one of the following releases:*
*2 (GSM Phase 2)*
*R96 (Release 1996)*
*R97 (Release 1997)*
*R98 (Release 1998)*
*R99 (Release 1999)*
*REL-4 (Release 4)*
*REL-5 (Release 5)*

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | The specification contains non-valid references. |
| ***Summary of change:*** | ⌘ | Deletion of GSM 01.04 reference because the content of GSM 01.04 has been incorporated into 3GPP TR 21.905. Conversion of GSM 04.08 and GSM 11.11 references to the equivalent 3GPP references. Wrong refernce to GSM 04.08 regarding the RP-ACK timeout corrected to 24.011. |
| ***Consequences if not approved:*** | ⌘ | Non-valid references would remain and make it difficult to find the right information. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 0.1, 0.2, 2.3.3.1, 2.3.3.3, 2.5.2 |
| ***Other specs affected:*** | ⌘ | ☐ Other core specifications ⌘<br>☐ Test specifications<br>☐ O&M Specifications |
| ***Other comments:*** | ⌘ | |

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

# Contents

# Foreword

This Technical Specification has been produced by the 3GPP.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 Indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the specification;

# 0 Scope

This Technical Specification (TS) defines three interface protocols for control of SMS functions within a GSM/UMTS mobile telephone from a remote terminal via an asynchronous interface.

Clause 2 defines a binary protocol (“Block Mode”). The protocol includes error protection and is suitable for use where the link may not be completely reliable. It will be of particular use where control of remote devices is required. Efficient transfer of binary encoded user data is possible.

Clause 3 defines a character-based interfaced based on “AT” commands (“Text Mode”). This mode is suitable for unintelligent terminals or terminal emulators, and for application software built on command structures like those defined in V.25ter. Some of the commands defined in clause 3 will also be useful for implementations of clause 2 and/or clause 4, for example enabling an indication of incoming SMS messages.

Clause 4 defines a character-based interface with hex-encoded binary transfer of message blocks (“PDU Mode”). This mode is suitable for software drivers based on AT command structures which do not understand the content of the message blocks and can only pass them between the MT and “upper level” software resident in the TE.

In all three modes, the terminal is considered to be in control for SMS/CBS transactions.

This specification considers the mobile termination to be a single entity. Other 3GPP/GSM Technical Specifications describe the split of functionality between the mobile equipment and (U)SIM.

The three “modes” referred to above, are represented in figure 0.1.

The “Block mode” is a self contained mode in its own right, and when entered, control will remain within that mode until the procedures to exit the mode are executed, after which control is returned to the V.25ter “command” state or “on-line command” state.

The “Text” and “PDU” modes are not in themselves V.25ter states but are simply sets of commands which will operate in either the V.25ter “command” state or “on-line command” state. The “Text” and “PDU” modes are transitory states and after each operation, control is automatically returned to the V.25ter “command” state or “on-line command” state. Whilst in the V.25ter command state, the MS is available to handle incoming and outgoing calls such as Data or Facsimile.

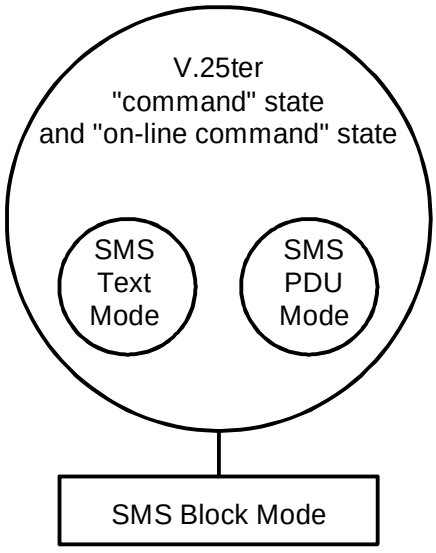


**Figure 0.1: Block, Text and PDU modes**

In the “Block mode” and “PDU” mode a mobile is not permitted to modify any component of an SMS/CBS message received from the air interface or an SMS message received from a TE, before passing it on, except where 3GPP TS 23.040 [3] or 3GPP TS 23.041 [4] defines a “component modification facility” and where this “component modification facility” is supported by the mobile. In the Text Mode the mobile may be unable to display characters coded in particular coding schemes. In this case, the mobile shall behave as described in 3GPP TS 23.038 [2] and assume the coding scheme to be the GSM 7 bit default alphabet.

## 0.1 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".void

[2] 3GPP TS 23.038: "Alphabets and language-specific information".

[3] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) ".

[4] 3GPP TS 23.041: "Technical realization of the Cell Broadcast Service (CBS)".

[5] GSM 04.083GPP TS 24.008: "Digital cellular telecommunications system (Phase 2+); Mobile Rradio Iinterface Llayer 3 specification; Core Network Protocols; Stage 3".

[6] 3GPP TS 24.011: "Short Message Service (SMS) support on mobile radio interface".

[7] 3GPP TS 24.012: "Cell Broadcast Service(CBS) support on the mobile radio interface".

[8] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[9] 3GPP TS 27.007: "AT command set for 3GPP User Equipment (UE)".

[10] 3GPP TSGSM 151.011: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[11] CCITT Recommendation V.25ter: “Serial Asynchronous Automatic Dialling And Control”

[12] CCITT Recommendation V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment".

[13] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[14] CCITT Recommendation E.163: "Numbering plan for the international telephone service".

[15] 3GPP TR 21.905 "3G Vocabulary"

[16] 3GPP TS 31.102: "Characteristics of the USIM application"

## 0.2 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04. [1] and 3GPP TR 21.905. [15].

Additionally, the following abbreviation is used:

EVPF Enhanced Validity Period Format

# 1 Reference configuration

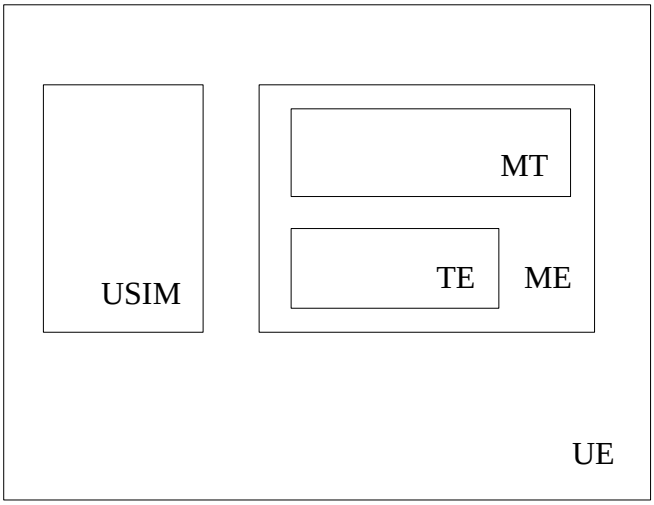


**Figure 1: Reference configuration**

The User Equipment (UE) consists of the mobile equipment (ME) and the (U)SIM. Messages may be stored in either, but this specification does not distinguish between messages stored in the (U)SIM or in the ME. The management of message storage in the two parts of the UE is a matter for the UE implementation.

## 1.1 V.24 Interface Circuits

The operation of the CCITT V.24 blue book interface circuits for SMS is shown in table 1.1.

**Table 1.1: Use of V.24 interface circuits**

| V.24 CIRCUIT | DESCRIPTION | TE to MT | MT to TE |
|---|---|---|---|
| CT102 | signal ground | x | x |
| CT103 | TXD | x | |
| CT104 | RXD | | x |
| CT105 | RTS | x | |
| CT106 | CTS | | x |
| CT107 | DSR | | x |
| CT108.2 | DTR | x | |
| CT109 | DCD | | x |

NOTE: CT105 at the TE is connected to CT133 at the MT

### 1.1.1 Circuit definitions for the SMS Block mode

**CT103**

All commands from the TE to the MT are transferred across this circuit. Inband flow control is not permitted during Block Mode.

**CT104**

All responses/indications from the MT to the TE are transferred across this circuit. Inband flow control is not permitted during Block Mode.

**CT105**

This circuit allows the TE to flow control the MT when in the Block Mode and at other times if hardware flow control is enabled.

**CT106**

This circuit allows the MT to flow control the TE when in the Block Mode and at other times if hardware flow control is enabled.

**CT107**

This circuit shall be set to the ON condition before entry into the Block Mode, and shall remain in the ON condition during Block Mode. If the TE detects that this circuit returns to the OFF condition during the block mode then the TE shall return CT108.2 to the OFF condition and exit the Block Mode.

**CT108.2**

This circuit shall be set in the ON condition before the AT+CESP command is sent from the TE to begin the Block Mode, and shall be maintained in the ON condition during the Block Mode. It shall be returned to the OFF condition after the command 'END SMS MODE' has been accepted and acknowledged by the MT. If the MT detects that this circuit returns to the OFF condition during the Block Mode then the MT shall exit the Block Mode.

**CT109**

This circuit shall be set to the ON condition before entry into the Block Mode and remain in the ON condition during the Block Mode. If the TE detects that this circuit returns to the OFF condition during the Block Mode then the TE shall return CT108.2 to the OFF condition and shall exit the Block Mode.

### 1.1.2 Circuit definitions for the SMS Text and PDU modes

Only circuits CT102, CT103 and CT104 are mandatory for the Text and PDU modes. The functionality and operation of other circuits shall be in accordance with V.25ter.

# 2 SMS Block Mode

## 2.1 Beginning and ending of SMS/CBS Block Mode

### 2.1.1 Beginning SMS/CBS Block Mode

As described in 3GPP TS 27.001 [8], the DTE/DCE interface is normally associated with the terminal adaptation function (TAF), if such a function is available. When no data connection is in progress, and the terminal equipment wishes to enter SMS/CBS mode, the command 'AT+CESP' shall be issued by the TE through the DTE/DCE interface requesting that the Block mode protocol described in this specification is to be used. The syntax of this command is further described in subclause 3.2.4 later. The syntax for these commands is derived from V.25ter, i.e. the command is encoded as an IA5 character string together with delimiters as described in V.25ter.

Upon receipt of this command, the mobile termination shall respond as follows:

If the mobile termination supports SMS/CBS block mode commands, responses and indications as described in this technical specification, it shall respond with 'OK' (or 0) and enter the SMS/CBS mode.

If the mobile termination does not support SMS/CBS block mode commands, responses and indications as described in this technical specification, it shall respond with 'ERROR' (or 4) and remain in the current mode..

Terminal software shall wait a short time (e.g. 5 seconds) for the ‘OK’ (0) or ‘ERROR’ (4) response. If neither response is received before the timeout then the terminal software shall assume that the block mode has been entered. The terminal software may then submit its first block mode command. If no response is received to this

command then the terminal software shall proceed as described below in subclause 2.2 (i.e. repeat the command 3 times and then exit the block mode).

If the SMS/CBS block mode command is accepted by the mobile termination, then all further commands, responses and indications shall be as defined in clause 2 of this technical specification. These SMS/CBS mode commands, responses and indications use 8-bit encoded data and not IA5 characters.

### 2.1.2 Returning from SMS/CBS Block Mode To Default Mode

When the terminal equipment wishes to return to default mode from SMS/CBS mode, it shall issue the command 'END SMS MODE', described in subclause 2.4.1.11. The mobile termination shall respond with 'OK' (or 0) to indicate that the DTE/DCE interface has returned to default mode. The TE shall change back to default mode whether or not such a response is received.

The TE may also indicate that it has exit from the SMS/CBS mode through the use of CT 108/2 (see subclause 1.1)

If an incoming data call arrives while the DTE/DCE interface is set to SMS/CBS mode, then the mobile termination may autonomously issue the 'END SMS MODE' indication (subclause 2.4.2.11) and revert to default mode in order to connect the data call through the TAF.

The MT may exit from SMS/CBS mode autonomously if the power to the MT is switched off and then on again. In addition, the MT manufacturer may provide MMI to change the mode back to the default mode. In the latter case, the MT shall issue the 'END SMS MODE' indication (subclause 2.4.2.11) and exit the SMS/CBS mode immediately.

The MT may also indicate that it has exit from the SMS/CBS mode through the use of CT 107 and CT 109 (see subclause 1.1).

A BREAK condition in either direction at the DTE/DCE interface shall cause the TE and the MT to exit from the SMS/CBS block mode and return to the default mode.

In the event where the TE or the MT find themselves unable to recover from a protocol error then either entity may exit the SMS/CBS mode using any of the mechanisms described above. Confirmation of default mode operation will be achieved through the use of AT commands and responses.

## 2.2 Protocol description

The communication path between the MT and the TE across the DTE/DCE interface should be quite reliable if it uses a short wire link. However, to ensure that the low error rate does not cause malfunction, the following error protection scheme is provided.

Each message sent from the MT to the TE or vice-versa consists of a data block (DATA) and block check sum (BCS, see figure 2.2.1). In the following description the notation DLE, STX, NUL and ETX refer to control characters having the values 10 02 00 and 03 hexadecimal respectively.

<- DATA -> <- BCS ->

| DLE 10H | STX 02H | Message content | DLE 10H | ETX 03H | BCS MSB | BCS LSB |
|---|---|---|---|---|---|---|

**Figure 2.2.1: Format of DTE/DCE interface messages**

The data block consists of a start transmission sequence, set to 00010000 00000010 (10 02 hex), the message content as defined below and an end transmission sequence, set to 00010000 00000011 (10 03 hex). The least significant bit of each octet is always transmitted first.

The block check sum is calculated at the transmitter by adding all of the octets in the message content modulo 65536. Each bit of the 16-bit result is then inverted, and 1 is added to the answer.

During transmission of the message content and the BCS octets, any occurrence of the value 10 hex (DLE) shall result in an additional 'stuffing' octet of value 00 hex (NUL) being transmitted immediately following the octet containing 10 hex. This is to ensure that the start and end markers are unambiguous. The receiver shall remove stuffing octets by discarding any octet of value 00 hex (NUL) which immediately follows an octet of value 10 hex (DLE).

After removal of any stuffing octets, the receiver can check the BCS by adding all of the octets in the message content and the 16-bit BCS modulo 65536. The correct result is 0000 hex. If any message is received with an incorrect BCS, then the message is discarded. No response is sent over the DTE/DCE interface, but an indication may be provided to higher layers within the receiving entity.

The transmitter shall only send DLE when it is followed by STX, NUL or ETX. Therefore, if the receiver sees a DLE followed by anything else then the receiver shall assume that some data has been lost, and shall start to search for the start marker. An unexpected end marker at the receiver shall also result in a search for a start marker. A start marker shall always be treated as the start of a new block, regardless of which state the receiver is in.

Examples of state diagrams for a block receiver to implement this procedure are given in Annex B, together with an example of coding and decoding a message.

Only one Command/Response transaction shall be permitted at any one time from any sending or receiving entity. It shall however be possible for a Command/Response transaction from one entity to be initiated even if there is a Command/Response transaction in progress from the other entity.

If an immediate response is expected to a message sent over the DTE/DCE interface, then the sending entity shall wait 10 seconds. If no response is received within this time, the sending entity shall repeat the message. The message shall be repeated a maximum of 3 times, after which the sending entity shall exit from the SMS/CBS mode and provide an error indication to the user.

If a message cannot be understood by the receiving entity even though it has a correct BCS, then it shall return an UNABLE TO PROCESS message with cause value 'Command not understood'. The receipt of an UNABLE TO PROCESS message should not in itself initiate re-transmission although re-transmission may take place due to the timeout mechanism described earlier since an UNABLE TO PROCESS is deemed to be an invalid response. The ‘Cause’ may however be referred to a higher layer. An UNABLE TO PROCESS shall not be sent as the result of an incorrect BCS.

## 2.3 Requesting messages already held in the Mobile Termination

The TE may request the MT to provide SMS or CBS messages already stored. The TE will either request all messages, or request a list of messages and subsequently ask for specific messages.

At the start of the SMS/CBS mode session, the MT shall number all messages contiguously, starting with message number 1. These "Short Message References" are only valid for a single SMS/CBS MODE session and should not be confused with the 3GPP TS 23.040 [3] TP-Message-Reference. Each message retains its Short Message Reference for the duration of the SMS/CBS mode session. New messages will normally be given the lowest previously-unused Short Message Reference. However, if all Short Message References have been used then the MT may reallocate Short Message References previously allocated to now-deleted messages.

Short Message Reference 0 signifies that there are no messages in the MT. The value of 0 is used under the following conditions:

- When an INSERT SMS command is used to transfer an SM over the air interface and not store it in the MT then the MT will return a Short Message Reference of 0 in the REQUEST CONFIRMED response and the ensuing INSERT SMS COMPLETE / INSERT SMS FAILURE indications.
- For Class 0 SM’s which are not stored in the MT
- For TE specific SM’s which are not stored in the MT

If Message number 0 is requested by the TE, the MT will always return an error cause, but will also include the highest valid Short Message Reference (see subclause 2.3.2.1 below).

### 2.3.1 Requesting List Of Messages

The TE may request the MT to provide a list of SMS and CBS messages currently stored in the mobile termination. This is achieved by the LIST REQUEST command (subclause 2.4.1.1). The MT divides the messages stored into groups of 5 (called pages) and transfers the first 5 in a MESSAGE LIST response (subclause 2.4.2.1) containing

message references allocated by the MT, plus the relevant header information described in 3GPP TS 23.040 [3]/24.011 [6] and 3GPP TS 23.041 [4] / 24.012 [7].

If there are no messages stored in the MT, then the MESSAGE LIST response shall be empty.

The TE may then request further groups of up to 5 messages by repeating the LIST REQUEST command for pages 2,3, and so on. The MT will indicate that there are no more pages by responding with an empty MESSAGE LIST response.

## 2.3.2 Requesting Transfer Of Messages

The TE may request the transfer of one or more messages by means of the commands described below. The MT does not delete messages which have been transferred. Messages can only be deleted by the DELETE MESSAGE command (subclause 2.4.1.9).

### 2.3.2.1 Requesting Transfer Of A Specific Message

The TE may request the MT to transfer a specific message by sending the GET MESSAGE command (subclause 2.4.1.2), including the appropriate message reference. The MT will provide the full message including header in a MESSAGE response (subclause 2.4.2.2). If the message reference is unallocated, then the GET MESSAGE FAILURE response is returned with cause 'No such message' and the highest valid Message Reference (subclause 2.4.2.3).

### 2.3.2.2 Requesting Transfer Of All Messages

The TE may request the MT to transfer all messages by sending the GET FIRST MESSAGE command (subclause 2.4.1.3), followed by the appropriate number of GET NEXT MESSAGE commands (subclause 2.4.1.4).

The MT shall be able to transfer all messages one-by-one, starting with the 'first' and continuing with the 'next'. The precise ordering of the messages is left to the MT implementation.

If the MT exits from SMS/CBS mode for any reason, then this information need not be retained.

On receipt of the GET FIRST MESSAGE command, the MT shall set a pointer to the first message, and transfer this message using the MESSAGE response as described in subclause 2.3.2.1.

On receipt of the GET NEXT MESSAGE command, the MT shall move the pointer to the first available message after the last message transferred (using either GET FIRST MESSAGE, GET MESSAGE or GET NEXT MESSAGE), and transfer this message using the MESSAGE response as described in subclause 2.3.2.1.

If the MT receives a GET NEXT MESSAGE command when all messages have been transferred to the TE, or there are no messages stored in the MT, then the GET MESSAGE FAILURE response shall be provided with the cause 'No such message' (see subclause 2.4.2.3).

If the TE receives an out of sequence message then it shall attempt to transfer the missing message using the GET MESSAGE command before continuing with GET NEXT MESSAGE. If this attempt fails with the cause 'no such message', it means that the message has been deleted, or it has been lost due to a failure at the MT.

The MT includes a LAST SHORT MESSAGE REFERENCE in the GET MESSAGE FAILURE response. This is so that the TE can detect whether or not the last short message was received in error.

If the MT receives a GET NEXT MESSAGE command prior to receiving a GET FIRST MESSAGE or GET MESSAGE command, then it shall continue as if the command had been GET FIRST MESSAGE (i.e. provide the 'first' message and continue with the 'next' on receipt of the subsequent GET NEXT MESSAGE command).

## 2.3.3 Requesting Diversion Of Incoming Messages

The TE may request the MT to transfer SMS or CBS messages directly from the air interface to the DTE/DCE interface, by the following procedures. If messages are diverted then they are not stored in the MT. If messages are diverted and there is no communication path to the TE (e.g. because it has been disconnected), the diversion shall be cancelled.

### 2.3.3.1 Requesting SMS Messages

The TE may request an indication of arrival of incoming SMS messages, or the direct transfer of incoming SMS messages.

The TE requests new SMS messages by the TRANSFER INC SMS command (subclause 2.4.1.5). This command will be sent with parameters indicating whether all incoming SMS messages are to be transferred, or only those indicated as being for the TE.

The MT shall confirm receipt of this command with a REQUEST CONFIRMED message provided there is memory available to store SM's in the ME or the (U)SIM. If there is no memory available, the MT shall respond with 'unable to process' with a cause value No memory.

The MT shall transfer incoming messages by the INC MESSAGE indication (subclause 2.4.2.4).

For an INC MESSAGE which contains a Short Message (SMS) info element id, the TE shall acknowledge receipt of the INC MESSAGE with an ACKNOWLEDGE MESSAGE (subclause 2.4.1.12). The MT should not send another INC MESSAGE which contains a Short Message (SMS) info element id to the TE whilst it is waiting for an ACKNOWLEDGE MESSAGE.

In the event of the MT not receiving an ACKNOWLEDGE MESSAGE within a time specified by the MT manufacturer the MT shall exit the SMS mode automatically after 'n' attempts to send the INC MESSAGE (where n is a number specified by the MT manufacturer). The MT should attempt to store the unacknowledged SM or Status Report (contained in the INC MESSAGE) in the MT or on the (U)SIM as appropriate.

The ACKNOWLEDGE MESSAGE sent from the TE to the MT must not delay the MT sending the RP-ACK defined in 3GPP TS 23.040 [3] (to the SC) for longer than the RP-ACK timeout specified in 3GPP TS 24.011~~GSM 04.08~~ [~~6~~5].

The TE requests the cessation of incoming message transfer by the same command, indicating no incoming messages. The transfer of messages will automatically cease on exit of the SMS/CBS mode. Transfer shall not recommence until a new request is issued by the TE.

### 2.3.3.2 Requesting CBS Messages

The TE may request the transfer of all cell broadcast messages directly from the air interface to the DTE/DCE interface. This is achieved by the use of the TRANSFER INC CBS message (subclause 2.4.1.7).

The MT shall confirm receipt of this command with a REQUEST CONFIRMED message.

After receipt of this command, the MT shall transfer all CBS pages as they arrive on the air interface, using the INC MESSAGE indication (subclause 2.4.2.4).

While the CBS pages are being transferred, any other indication or response required to be sent to the TE will take precedence over the CBS pages. However, the MT shall not interrupt the transfer of a page to send other information within the SMS/CBS mode (ie. the MT shall wait until a page boundary).

The transfer of messages will automatically cease on exit of the SMS/CBS mode. Transfer shall not recommence until a new request is issued by the TE.

### 2.3.3.3 Requesting indication of message arrival

If the TE requires an indication of incoming message arrival, the INDICATE INC SMS command (subclause 2.4.1.6) shall be used.

The MT shall confirm receipt of this command with a REQUEST CONFIRMED message.

After receipt of this command, the MT shall indicate all incoming messages in the specified categories (unless they are directly transferred) with the MESSAGE ARRIVED indication (subclause 2.4.2.5). This indication shall be of the same format as the MESSAGE LIST response described in subclause 2.3.1.

The TE shall acknowledge receipt of the MESSAGE ARRIVED with an ACKNOWLEDGE MESSAGE. (subclause 2.4.1.12). The MT should not send another MESSAGE ARRIVED to the TE whilst it is waiting for an ACKNOWLEDGE MESSAGE.

In the event of the MT not receiving an ACKNOWLEDGE MESSAGE within a time specified by the MT manufacturer the MT shall exit the SMS mode automatically after 'n' attempts to send the MESSAGE ARRIVED (where n is a number specified by the MT manufacturer). The MT should attempt to store the unacknowledged SM or Status Report in the MT or on the (U)SIM as appropriate.

The ACKNOWLEDGE MESSAGE sent from the TE to the MT must not delay the MT sending the RP-ACK defined in 3GPP TS 23.040 [3] (to the SC) for longer than the RP-ACK timeout specified in the 3GPP TS 24.011~~GSM 04.08~~ [~~5~~6].

The TE requests the cessation of incoming message indication by the INDICATE INC SMS command, with the 'no incoming messages' parameter.

## 2.3.4 Requesting Transfer Into Mobile Termination

The TE may request transfer of SMS messages into the mobile termination. Cell broadcast messages cannot be transferred in this direction.

The TE shall use the INSERT SMS command (subclause 2.4.1.8) to transfer the message. This command shall indicate whether the message is to be stored in the MT, sent over the air interface or both. The command shall include the full SMS message and header as described in 3GPP TS 23.040 [3], except for the message reference and message type indication (which are allocated by the MT).

Only one INSERT SMS command may be outstanding at any given instant. An INSERT SMS is deemed complete when an INSERT SMS COMPLETE or an INSERT SMS FAILURE indication has been received irrespective of whether an intermediate REQUEST CONFIRMED has been received.

Upon receipt of an INSERT SMS command, the MT shall act in the following way:

If the TE requested the MT to store the message, the MT shall attempt to store the message. If the attempt is successful, the MT shall return an INSERT SMS COMPLETE indication (subclause 2.4.2.6), including the message reference allocated by the MT. If the attempt fails (eg. due to lack of memory), the MT shall return an INSERT SMS FAILURE indication (subclause 2.4.2.7), providing a cause for the failure.

If the TE requested the MT to send the message, the MT shall respond immediately with a REQUEST CONFIRMED message, and attempt to send the message. If the send attempt subsequently succeeds, the MT shall send an INSERT SMS COMPLETE indication, including the message references allocated by the MT. If the send attempt subsequently fails, the MT shall return an INSERT SMS FAILURE indication, providing a cause for the failure.

If the TE requested the MT to store and send the message, the MT shall first attempt to store the message. If no storage is available, the MT shall return an INSERT SMS FAILURE indication (subclause 2.4.2.7) and shall not attempt to send the message. If storage is available, the MT shall store the message and then respond with a REQUEST CONFIRMED message. If the send attempt is successful, the MT shall return an INSERT SMS COMPLETE indication (subclause 2.4.2.6), including the message references allocated by the MT. If the transmission of the message fails, then the MT shall return an INSERT SMS FAILURE indication (subclause 2.4.2.7). This will show that the send attempt failed and provide a cause. After that the MT shall delete the stored message.

## 2.3.5 Requesting Deletion Of Messages

The TE may request deletion of SMS or CBS messages from the store in the MT. This is achieved by the DELETE MESSAGE command (subclause 2.4.1.9). The command will include a message reference, as defined by the MT and provided in the message list.

Upon receipt of this command, the MT shall attempt to delete the message. If successful, the MT shall return a DELETE MESSAGE COMPLETE indication (subclause 2.4.2.8). If not successful, the MT shall return a DELETE MESSAGE FAILURE indication (subclause 2.4.2.9).

On successful deletion of an SM or CBS message the Page Index (see 2.5.2.10) and the Index Count (see 2.5.2.8) shall be re-assigned so that their values are contiguous (i.e. there are no gaps in either parameter). The original short message Reference values remain unchanged.

# 2.4 Message functional definitions and contents

This subclause provides an overview of the message structure to be used over the DTE/DCE interface in SMS/CBS block mode. Each message definition includes a brief description of the use of the message, and a table showing all the information elements which may be included in the message. If an entity receives a message containing more information elements than expected then the receiving entity shall ignore the additional information elements. For each information element the following data are provided:

Reference - this indicates where the detailed description of each element can be found.

**Presence:**

| | | |
|---|---|---|
| M | Mandatory | must always be present<br>receiver: If not present, consider message erroneous |
| C | Conditional | presence depending on e.g.<br>a) value of other element<br>b) presence of optional element<br>receiver: If not present when condition met, consider message erroneous |
| O | Optional | presence is a choice of the sender<br>receiver: present or not, accept message |

Format:

| | |
|---|---|
| T | Type only, fixed length, only IEI |
| V | Value only, fixed length, no IEI included |
| TV | Type and value, fixed length, IEI included |
| LV | Length and value, variable length, no IEI included and Length indicator included |
| TLV | Type, Length and Value, variable length, IEI and length indicator included |

Length - this indicates the length of the information element in octets.

## 2.4.1 Commands Issued By The Terminal Equipment

Table 2.4.1 summarises the commands which may be issued by the TE.

**Table 2.4.1: Commands which may be issued by the TE**

| | Reference |
|---|---|
| LIST REQUEST | 2.4.1.1 |
| GET MESSAGE | 2.4.1.2 |
| GET FIRST MESSAGE | 2.4.1.3 |
| GET NEXT MESSAGE | 2.4.1.4 |
| TRANSFER INC SMS | 2.4.1.5 |
| INDICATE INC SMS | 2.4.1.6 |
| TRANSFER INC CBS | 2.4.1.7 |
| INSERT SMS | 2.4.1.8 |
| DELETE MESSAGE | 2.4.1.9 |
| UNABLE TO PROCESS | 2.4.1.10 |
| END SMS MODE | 2.4.1.11 |
| ACKNOWLEDGE MESSAGE | 2.4.1.12 |

### 2.4.1.1 List Request

This message is sent by the TE to the MT to request a list of messages stored in the MT.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Page Index | 2.5.2.10 | M | V | 1 |

### 2.4.1.2 Get Message

This message is sent by the TE to the MT to request transfer of a specific SMS or CBS message stored in the MT.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Reference | 2.5.2.1 | M | V | 1 |

### 2.4.1.3 Get First Message

This message is sent by the TE to the MT to request transfer of the first available SMS or CBS message stored in the MT.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |

### 2.4.1.4 Get Next Message

This message is sent by the TE to the MT to request transfer of the next available SMS or CBS message stored in the MT.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |

### 2.4.1.5 Transfer Inc SMS

This message is sent by the TE to the MT to request the direct transfer of incoming messages from the air interface to the TE.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| SMS Transfer Type | 2.5.2.2 | M | V | 1 |

### 2.4.1.6 Indicate Inc SMS

This message is sent by the TE to the MT to request that the MT indicates when an incoming message arrives.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Indication Type | 2.5.2.3 | M | V | 1 |

### 2.4.1.7 Transfer Inc CBS

This message is sent by the TE to the MT to request transfer of all cell broadcast messages directly from the air interface to the DTE/DCE interface.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| CBS Transfer Type | 2.5.2.9 | M | V | 1 |

### 2.4.1.8 Insert SMS

This message is sent by the TE to the MT to request the transfer of an SMS TPU to the MT memory or across the air interface. The TPDU is formatted in exactly the same way as described in 3GPP TS 23.040 [3]. Where the TPDU includes a TP-Message-Reference which is to be incremented by the MT for every outgoing message, the TP-Message-Reference provided by the TE will be overwritten by the MT before transmission of the message. The value provided by the TE is discarded by the MT and has no significance.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Insert Type | 2.5.2.4 | M | V | 1 |
| RP-Destination-Address | 3GPP TS 24.011 [6] | M | LV | 1-12 a) |
| SMS-TPDU | 3GPP TS 23.040 [3] | M | V | max 164 |

a) If no RP-Destination-Address is to be transferred then the length is set to 0. In this case, the MT inserts the default SC address.

### 2.4.1.9 Delete message

This message is sent from the TE to the MT to request deletion of a specific SMS or CBS message held in the MT.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Reference | 2.5.2.1 | M | V | 1 |

### 2.4.1.10 Unable to process

This response is sent from the TE to the MT to indicate that the MT's message could not be processed.

| Information element | Preference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Cause | 2.5.2.7 | M | V | 1 |

### 2.4.1.11 End SMS Mode

This message is sent from the TE to the MT to terminate the SMS/CBS mode of the DTE/DCE interface.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |

### 2.4.1.12 Acknowledge Message

This message is sent from the TE to the MT to acknowledge receipt of a INC MESSAGE or MESSAGE ARRIVED which contains a Short Message (SMS) info element id, (e.g. a Short Message or a Status Report but not a CBS message.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| SM-Deliver-Ack | 2.5.2.14 | O | TLV | 2 to 160 |

## 2.4.2 Responses/Indications Issued By The MT

Table 2.4.2 summarises the responses/indications which may be issued by the MT.

**Table 2.4.2: Responses/Indications which may be issued by the MT**

| | Reference |
|---|---|
| MESSAGE LIST | 2.4.2.1 |
| MESSAGE | 2.4.2.2 |
| GET MESSAGE FAILURE | 2.4.2.3 |
| INC MESSAGE | 2.4.2.4 |
| MESSAGE ARRIVED | 2.4.2.5 |
| INSERT SMS COMPLETE | 2.4.2.6 |
| INSERT SMS FAILURE | 2.4.2.7 |
| DELETE MESSAGE COMPLETE | 2.4.2.8 |
| DELETE MESSAGE FAILURE | 2.4.2.9 |
| UNABLE TO PROCESS | 2.4.2.10 |
| END SMS MODE | 2.4.2.11 |
| REQUEST CONFIRMED | 2.4.2.12 |

### 2.4.2.1 Message List

This response is sent from the MT to the TE on receipt of a LIST REQUEST from the TE.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Page Index | 2.5.2.10 | M | V | 1 |
| Index Count | 2.5.2.8 | M | V | 1 |
| Short Message Index (1) | 2.5.2.5 | O | TLV | 8-48 |
| Short Message Index (2) | 2.5.2.5 | O | TLV | 8-48 |
| : | : | : | : | : |
| Short Message Index (n) | 2.5.2.5 | O | TLV | 8-48 |

The number of Short Message Indices included in the message may be 0, 1, 2, 3, 4 or 5.

### 2.4.2.2 Message

This response is sent from the MT to the TE when a short message has been requested.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Data | 2.5.2.6 | M | TLV | 28-181 |

### 2.4.2.3 Get Message Failure

This response is sent from the MT to the TE when a request for a short message cannot be fulfilled.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Last Short Message | 2.5.2.11 | M | V | 1 |
| Cause | 2.5.2.7 | M | V | 1 |

### 2.4.2.4 Inc Message

This indication is sent from the MT to the TE after the MT has been requested to transfer messages of certain categories immediately upon receipt.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Data | 2.5.2.6 | M | TLV | 28-181 |

### 2.4.2.5 Message Arrived

This indication is sent from the MT to the TE after the MT has been requested to provide an indication of the receipt of certain categories of incoming message.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Index | 2.5.2.5 | M | TLV | 8-48 |

### 2.4.2.6 Insert SMS Complete

This response is sent by the MT to the TE to indicate that the TE's request to insert a message has been completed.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Reference | 2.5.2.1 | M | V | 1 |
| TP-Message Reference | 3GPP TS 23.040 [3] | C a) | V | 1 |
| SM-Submit-Ack | 2.5.2.15 | O | TLV | 2 to 160 |

a) The TP-Message Reference is only included if the message had been requested to be transferred over the air interface.

### 2.4.2.7 Insert SMS Failure

This response is sent from the MT to the TE to indicate that the attempt to insert an SMS message failed.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Cause | 2.5.2.7 | M | V | 1-2 |
| TP-Failure Cause | 2.5.2.13 | O | TLV | 4 |
| Short Message Reference | 2.5.2.1 | O | TV | 2 |

#### 2.4.2.8 Delete Message Complete

This response is sent from the MT to the TE to indicate that the request to delete a message from the MT store has been completed.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Reference | 2.5.2.1 | M | V | 1 |

#### 2.4.2.9 Delete Message Failure

This response is sent from the MT to the TE to indicate that the request to delete a message from the MT store failed.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Short Message Reference | 2.5.2.1 | M | V | 1 |
| Cause | 2.5.2.7 | M | V | 1 |

#### 2.4.2.10 Unable To Process

This response is sent from the MT to the TE to indicate that the TE's request could not be processed.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Cause | 2.5.2.7 | M | V | 1 |

#### 2.4.2.11 End SMS Mode

This indication is sent from the MT to the TE when the MT autonomously exits from SMS/CBS mode.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Cause | 2.5.2.7 | M | V | 1 |

#### 2.4.2.12 Request Confirmed

This indication is sent from the MT to the TE to indicate that the MT has received the request from the TE and will perform the requested function.

| Information element | Reference | Presence | Format | Length |
|---|---|---|---|---|
| Message Type | 2.5.1 | M | V | 1 |
| Confirm Type | 2.5.2.12 | M | V | 1 |
| Short Message Reference | 2.5.2.1 | O | TV | 2 |

## 2.5 General message format and information elements coding

This subclause describes the content of messages for the SMS/CBS mode of the DTE/DCE interface. Within the figures in this subclause, the bit designated "bit 1" is transmitted first, followed by bits 2,3,4 etc. Similarly, the octet shown at the top of each figure is sent first.

### 2.5.1 Message Type

The purpose of the message type is to identify the function of the message being sent. The message type is coded as shown in figure 2.5.1 and table 2.5.1.

Bit 8 is reserved for possible future use as an extension bit.

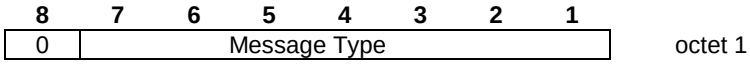


**Figure 2.5.1: Message Type**

**Table 2.5.1: Message Types**

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | - | - | - | - | - | Commands/ Responses issued by TE |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | LIST REQUEST |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | GET MESSAGE |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | GET FIRST MESSAGE |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | GET NEXT MESSAGE |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | TRANSFER INC SMS |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | INDICATE INC SMS |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | TRANSFER INC CBS |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | INSERT SMS |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | DELETE MESSAGE |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | UNABLE TO PROCESS |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | END SMS MODE |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | ACKNOWLEDGE MESSAGE |
| 0 | 0 | 1 | - | - | - | - | - | Responses/Indications issued by MT |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | MESSAGE LIST |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | MESSAGE |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | GET MESSAGE FAILURE |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | INC MESSAGE |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | MESSAGE ARRIVED |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | INSERT SMS COMPLETE |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | INSERT SMS FAILURE |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | DELETE MESSAGE COMPLETE |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | DELETE MESSAGE FAILURE |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | UNABLE TO PROCESS |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | REQUEST CONFIRMED |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | END SMS MODE |

All other values are reserved. If a reserved Message Type is received then the receiving entity shall return “Unable to Process” with Cause “Command not understood”.

## 2.5.2 Other Information Elements

Other information elements follow the general coding principles specified in 3GPP TS 24.008~~GSM 04.08~~ [5], and are described in the following subclauses.