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European digital cellular telecommunications system (Phase 2); Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS) (GSM 07.05)

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This ETS defines a protocol for use of the V series DTE/DCE interface over the R reference point for SMS and CBS procedures within the European digital cellular telecommunications system (Phase 2).

This ETS correspond to GSM technical specification, GSM 07.05 version 4.3.2.

The specification from which this ETS has been derived was originally based on CEPT documentation, hence the presentation of this ETS may not be entirely in accordance with the ETSI/PNE rules.

Reference is made within this ETS to GSM Technical Specifications (GSM-TS) (NOTE).

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the European digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETSs (Phase 1), or ETSs (Phase 2), whilst others may become ETSI Technical Reports (ETRs). GSM-TSs are, for editorial reasons, still referred to in current GSM ETSs.

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0.1   SCOPE

For connection of terminals with SMS functions to the MT, the use of the R or S interface reference points is specified in TS GSM 03.40.

This Technical Specification defines a protocol for use of the V series DTE/DCE interface over the R reference point for SMS and CBS procedures. It covers the commands which may be issued from the terminal (DTE) to the mobile termination (DCE), and responses/indications which may be given in return by the mobile. The invocation and release of the SMS functionality within the MT is carried out using a command structure derived from the V.25bis command syntax.

Within this specification, all references to "V.25bis" refer to the CCITT blue book version, unless explicitly stated otherwise.

The SMS/CBS protocol across the DTE/DCE interface uses asynchronous mode commands (issued by the terminal) and responses/indications (issued by the mobile termination). The terminal is considered to be in control for SMS/CBS transactions.

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

The protocol described here is not mandatory, and it is therefore permitted for a manufacturer to implement proprietary protocols.   However, these protocols must follow the procedures described in section 2 below, except for the 'END SMS MODE' command described in section 2.2. This command may have a different syntax in proprietary protocols, although its function (ie. the return of the MT and TE into the default mode) must remain unchanged.

0.2   Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1]   GSM 01.04 (ETR 100): "European digital cellular telecommunication system (Phase 2); Definitions, abbreviations and acronyms".

[2]   GSM 03.38 (ETS 300 628): "European digital cellular telecommunication system (Phase 2); Alphabet and language specific information".

[3]   GSM 03.40 (ETS 300 536): "European digital cellular telecommunication system (Phase 2); Technical realization of the Short Message Service (SMS) Point to Point (PP)".

[4]   GSM 03.41 (ETS 300 537): "European digital cellular telecommunication system (Phase 2); Technical realization of Short Message Service Cell Broadcast (SMSCB)".

[5]   GSM 04.08 (ETS 300 557): "European digital cellular telecommunication system (Phase 2); Mobile radio interface layer 3 specification".

[6]   GSM 04.11 (ETS 300 559): "European digital cellular telecommunication system (Phase 2); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[7]   GSM 04.12 (ETS 300 560): "European digital cellular telecommunication system (Phase 2); Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[8]   GSM 07.01 (ETS 300 582): "European digital cellular telecommunication system (Phase 2); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[9]   GSM 07.06 (ETS 300 586): "European digital cellular telecommunication system (Phase 2); Use of the V series Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface at the Mobile Station (MS) for Mobile Termination (MT) configuration".

[10]   GSM 11.11 (ETS 300 608): "European digital cellular telecommunication system (Phase 2); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[11]   CCITT Recommendation V.25bis: "Automatic Calling and/or Answering Equipment on the General Switched Telephone Network (GSTN) using the 100-series interchange circuits".

[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".

0.3   Definitions and abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

1   REFERENCE CONFIGURATION
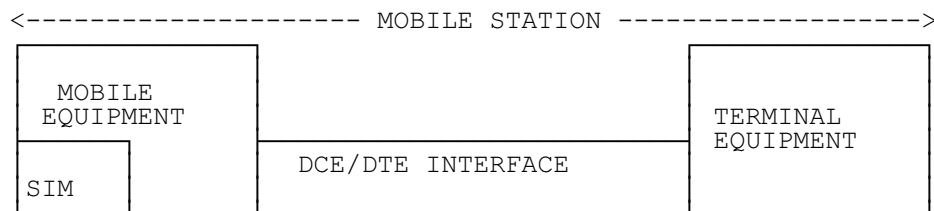
```
<--------------------- MOBILE STATION ------------------->

+------------------+                        +------------------+
|  MOBILE          |                        |                  |
|  EQUIPMENT       |                        | TERMINAL         |
|            +-----+------------------------| EQUIPMENT        |
|            |     |  DCE/DTE INTERFACE     |                  |
|  SIM       |     |                        |                  |
+------------+-----+                        +------------------+

MOBILE TERMINATION (MT2)
```

Figure 1   Reference configuration

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

2   BEGINNING AND ENDING OF SMS/CBS MODE

2.1   Beginning SMS/CBS Mode

As described in TS GSM 07.01, 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 'SMS B' 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 use of a character mode protocol by entering the command 'SMS C' allows for further extension. The syntax for these commands is derived from V.25bis, ie. the command is encoded as an IA5 character string together with delimeters as described in V.25bis.

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

> If the mobile termination supports SMS/CBS mode commands, responses and indications as described in this technical specification, it shall respond with 'VAL' and enter the SMS/CBS mode. The syntax of this response is derived from V.25bis, ie. the command is encoded as an IA5 character string together with delimeters as described in V.25bis.
> If the mobile termination does not support SMS/CBS mode commands, responses and indications as described in this technical specification, it shall respond with 'INV' and remain in the current mode. The syntax of this response is derived from V.25bis, ie. the command is encoded as an IA5 character string together with delimeters as described in V.25bis.

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

Whilst not in SMS mode and without data calls pending, the MT may indicate to the TE via the DTE/DCE interface that SMS or CBS messages have arrived. The following two indications are permitted:

> 'INC SMS'   At least one SMS message has arrived
> 'INC CBS'   At least one CBS message has arrived

If this feature is supported, the MT manufacturer may wish to allow it to be enabled and disabled by MMI commands. Such MMI commands are outside of the scope of this Technical Specification. The feature may also be enabled or disabled by a configuration command sent over the DTE/DCE interface as described in GSM 07.06. The default state will always be disabled.

2.2   Returning from SMS/CBS 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 section 4.1.11. The mobile termination shall respond with 'VAL' 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.

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 (section 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 (section 4.2.11).

The 'END SMS MODE' command may have a different syntax in proprietary protocols, although its function (ie. the return of the MT and TE into the default mode) must remain unchanged.

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

2.3   V.24 Interface Circuits during the SMS/CBS Mode

The operation of the CCITT V.24 blue book interface circuits is shown in table 2.3/GSM 07.05.

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

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

Table 2.3/GSM 07.05   Use of V.24 interface circuits

CT103
All commands from the TE to the MT are transferred across this circuit. Inband flow control is not permitted.

CT104
All responses/indications from the MT to the TE are transferred across this circuit. Inband flow control is not permitted.

CT105
This circuit allows the TE to flow control the MT when in the SMS/CBS mode.

CT106
This circuit allows the MT to flow control the TE when in the SMS/CBS mode.

CT107
This circuit shall be set to the ON condition after confirmation of entry into the SMS/CBS mode (ie. after the 'VAL' response), and shall be set to the OFF condition after confirmation of exit from the SMS/CBS mode.

CT108.2
This circuit shall be set in the ON condition before the 'SMS' command is sent from the TE to begin the SMS/CBS mode, and shall be maintained in the ON condition during the SMS/CBS 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 SMS/CBS mode then the MT shall exit the SMS/CBS mode.

CT109
This circuit shall remain in the ON condition in the SMS/CBS mode.

3   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 3.1). 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 | STX | MESSAGE CONTENT | DLE | ETX | BCS | BCS |
         | 10H | 02H |                 | 10H | 03H | MSB | LSB |
         +-----+-----+-----------------+-----+-----+-----+-----+
                               ...
```
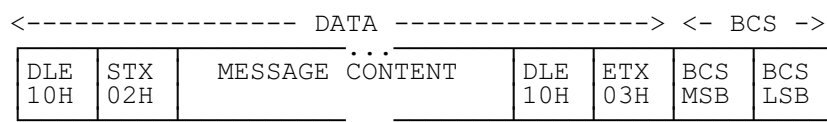
Figure 3.1/GSM 07.05   Format of DTE/DCE interface messages

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 occurence 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 1, together with an example of coding and decoding a message.

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'.

3.1   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 "Message References" are only valid for a single SMS/CBS MODE session. Each message retains its Message Reference for the duration of the SMS/CBS mode session. New

messages will normally be given the lowest previously-unused Message Reference. However, if all Message References have been used then the MT may reallocate Message References previously allocated to now-deleted messages.

Message Reference 0 is not used as this Reference signifies that there are no messages 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 Message Reference (see section 3.1.2.1 below).

3.1.1 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 (section 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 (section 4.2.1) containing message references allocated by the MT, plus the relevant header information described in GSM 03.40/04.11 and GSM 03.41/04.12.

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.

3.1.2 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 (section 4.1.9).

3.1.2.1 Requesting Transfer Of A Specific Message

The TE may request the MT to transfer a specific message by sending the GET MESSAGE command (section 4.1.2), including the appropriate message reference. The MT will provide the full message including header in a MESSAGE response (section 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 (section 4.2.3).

3.1.2.2 Requesting Transfer Of All Messages

The TE may request the MT to transfer all messages by sending the GET FIRST MESSAGE command (section 4.1.3), followed by the appropriate number of GET NEXT MESSAGE commands (section 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 section 3.1.2.1.

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 MESSAGE or GET NEXT MESSAGE), and transfer this message using the MESSAGE response as described in section 3.1.2.1.

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 section 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 command, then it shall continue as if the command had been GET FIRST MESSAGE (ie. provide the 'first' message and continue with the 'next' on receipt of the subsequent GET NEXT MESSAGE command).

3.2 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 (eg because it has been disconnected), the diversion shall be cancelled.

3.2.1 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 (section 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.

The MT shall transfer incoming messages by the INC MESSAGE indication (section 4.2.4).

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.

3.2.2 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 (section 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 (section 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.

3.2.3 Requesting indication of message arrival

If the TE requires an indication of incoming message arrival, the INDICATE INC SMS command (section 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 (section 4.2.5). This indication shall be of the same format as the MESSAGE LIST response described in section 3.1.1.

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

3.3 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 (section 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 TS GSM 03.40, 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.

Upon receipt of this 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 (section 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 (section 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 (section 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 (section 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 (section 4.2.7). This will show that the send attempt failed and provide a cause.The message reference allocated by the MT for the successful storage is returned.

3.4 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 (section 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 (section 4.2.8). If not successful, the MT shall return a DELETE MESSAGE FAILURE indication (section 4.2.9).

4   MESSAGE FUNCTIONAL DEFINITIONS AND CONTENTS

This section provides an overview of the message structure to be used over the DTE/DCE interface in SMS/CBS 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. 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 receiver: If not present, consider message erroneous
C	Conditional	presence depending on e.g. a) value of other element b) presence of optional element receiver: If not present when condition met, consider message erroneous
O	Optional	presence is a choice of the sender 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.

4.1   Commands Issued By The Terminal Equipment

Table 4.1/GSM 07.05 summarises the commands which may be issued by the TE.

	Reference
LIST REQUEST	4.1.1
GET MESSAGE	4.1.2
GET FIRST MESSAGE	4.1.3
GET NEXT MESSAGE	4.1.4
TRANSFER INC SMS	4.1.5
INDICATE INC SMS	4.1.6
TRANSFER INC CBS	4.1.7
INSERT SMS	4.1.8
DELETE MESSAGE	4.1.9
UNABLE TO PROCESS	4.1.10
END SMS MODE	4.1.11

TABLE 4.1/GSM 07.05   Commands which may be issued by the TE

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	5.1	M	V	1
Page Index	5.2.10	M	V	1

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	5.1	M	V	1
Short Message Reference	5.2.1	M	V	1

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	5.1	M	V	1

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	5.1	M	V	1

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	5.1	M	V	1
SMS Transfer Type	5.2.2	M	V	1

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	5.1	M	V	1
Indication Type	5.2.3	M	V	1

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	5.1	M	V	1
CBS Transfer Type	5.2.9	M	V	1

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 TS 03.40. Where the TPDU includes a TP-Message-Reference which is to be incremented by the MS for every outgoing message, the TP-Message-Reference provided by the TE will be overwritten by the MT before transmission of the message.

Information element	Reference	Presence	Format	Length
Message Type	5.1	M	V	1
Insert Type	5.2.4	M	V	1
RP-Destination-Address	GSM 04.11	M	LV	1-12 a)
SMS-TPDU	GSM 03.40	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.

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	5.1	M	V	1
Short Message Reference	5.2.1	M	V	1

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	Peference	Presence	Format	Length
Message Type	5.1	M	V	1
Cause	5.2.7	M	V	1

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	5.1	M	V	1

4.2   Responses/Indications Issued By The MT

Table 4.2/GSM 07.05 summarises the responses/indications which may be issued by the MT.

	Reference
MESSAGE LIST	4.2.1
MESSAGE	4.2.2
GET MESSAGE FAILURE	4.2.3
INC MESSAGE	4.2.4
MESSAGE ARRIVED	4.2.5
INSERT SMS COMPLETE	4.2.6
INSERT SMS FAILURE	4.2.7
DELETE MESSAGE COMPLETE	4.2.8
DELETE MESSAGE FAILURE	4.2.9
UNABLE TO PROCESS	4.2.10
END SMS MODE	4.2.11
REQUEST CONFIRMED	4.2.12

TABLE 4.2/GSM 07.05   Responses/Indications which may be issued by the MT

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	5.1	M	V	1
Page Index	5.2.10	M	V	1
Index Count	5.2.8	M	V	1
Short Message Index (1)	5.2.5	O	TLV	8-48
Short Message Index (2)	5.2.5	O	TLV	8-48
:	: :	:	:	:
Short Message Index (n)	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.

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	5.1	M	V	1
Short Message Data	5.2.6	M	TLV	28-181

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	5.1	M	V	1
Last Short Message	5.2.11	M	V	1
Cause	5.2.7	M	V	1

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	5.1	M	V	1
Short Message Data	5.2.6	M	TLV	28-181

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	5.1	M	V	1
Short Message Index	5.2.5	M	TLV	8-48

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	5.1	M	V	1
Short Message Reference	5.2.1	M	V	1
TP-Message Reference	GSM 03.40	C a)	V	1

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

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	5.1	M	V	1
Cause	5.2.7	M	V	1-2
TP-Failure Cause	5.2.13	O	TLV	4

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	5.1	M	V	1
Short Message Reference	5.2.1	M	V	1

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	5.1	M	V	1
Short Message Reference	5.2.1	M	V	1
Cause	5.2.7	M	V	1

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	5.1	M	V	1
Cause	5.2.7	M	V	1

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	5.1	M	V	1
Cause	5.2.7	M	V	1

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	5.1	M	V	1
Confirm Type	5.2.12	M	V	1

5 GENERAL MESSAGE FORMAT AND INFORMATION ELEMENTS CODING

This section describes the content of messages for the SMS/CBS mode of the DTE/DCE interface. Within the figures in this section, 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.

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 5.1/GSM 07.05 and table 5.1/GSM 07.05.

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

```
    8        7   6   5   4   3   2   1
  +-----+------------------------------------+
  |  0  |          Message Type              |   octet 1
  +-----+------------------------------------+
```
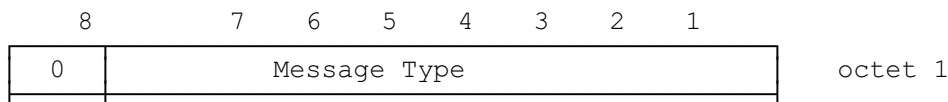
FIGURE 5.1/GSM 07.05 Message Type

```
        8 7 6 5 4 3 2      1

    0 0 0 - - - - -         Commands 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 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
```

TABLE 5.1/GSM 07.05   Message Types

5.2 Other Information Elements

Other information elements follow the general coding principles specified in TS GSM 04.08, and are described in the following sections.

5.2.1 Short Message Reference

The Short Message Reference uniquely identifies a short message stored in the MT. It is an 8 bit number and is allocated by the MT.

The Short Message Reference information element is coded as shown in figure 5.2/GSM 07.05 and table 5.2/GSM 07.05.

```
 8      7      6      5      4      3      2      1

 0      0      0      0      0      0      0      0       octet 1
        Short Message Reference info element id

           Short Message Reference value                 octet 2
```
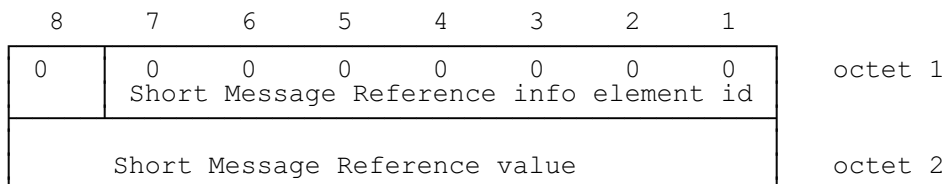
FIGURE 5.2/GSM 07.05 Short Message Reference information element

Short Message Reference value (octet 2).

In the Short Message Reference value field bit 8 of octet 2 is the most significant bit and bit 1 of octet 2 is the least significant bit.

Short Message Reference values are allocated by the MT.

TABLE 5.2/GSM 07.05   Short Message Reference information element

5.2.2   SMS Transfer Type

The SMS Transfer Type indicates to the MT which SMS messages are required to be transferred to the TE.

The SMS Transfer Type information element is coded as shown in figure 5.3/GSM 07.05 and table 5.3/GSM 07.05.

```
    8       7       6       5       4       3       2       1
 ┌───────┬───────────────────────────────────────────────────┐
 │  0    │   0       0       0       0       0       0       1 │  octet 1
 │       │   SMS Transfer Type info element ident             │
 ├───────┼───────────────────────────────────┬───────────────┤
 │  0        0       0       0       0        │ SMS Txfr      │
 │            Reserved                        │ Type value    │  octet 2
 └────────────────────────────────────────────────────────────┘
```

FIGURE 5.3/GSM 07.05 SMS Transfer Type information element

SMS Txfr Type value (octet 2).
The SMS txfr type is coded as follows:

<table>
<tr><td>bit 2</td><td>bit 1</td><td></td></tr>
<tr><td>0</td><td>0</td><td>Transfer no SMS messages</td></tr>
<tr><td>0</td><td>1</td><td>Transfer SMS messages marked as
TE-specific</td></tr>
<tr><td>1</td><td>0</td><td>Reserved</td></tr>
<tr><td>1</td><td>1</td><td>Transfer all SMS messages</td></tr>
</table>

Bit 3 shows whether to transfer SMS reports

<table>
<tr><td>Bit 3</td><td></td></tr>
<tr><td>0</td><td>Do not transfer SMS reports</td></tr>
<tr><td>1</td><td>Transfer SMS reports</td></tr>
</table>

TABLE 5.3/GSM 07.05   SMS Transfer Type information element

5.2.3 Indication Type

The Indication Type tells the MT when to notify the TE that an incoming message has been received.

The Indication Type information element is coded as shown in figure 5.4/GSM 07.05 and table 5.4/GSM 07.05.

```
   8      7      6      5      4      3      2      1

   0      0      0      0      0      0      1      0    octet 1
          Indication Type info element identifier

   0      0      0      0           Indication Type
                Reserved                 value              octet 2
```
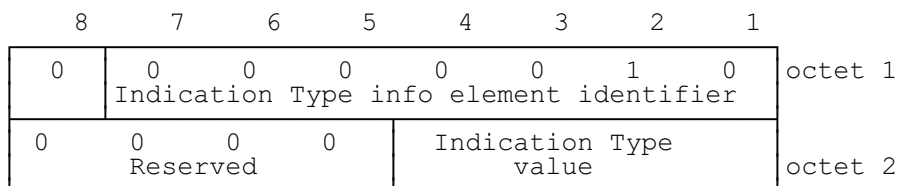
FIGURE 5.4/GSM 07.05 Indication Type information element

Indication Type value (octet 2).

The indication type is coded as follows:

bit 3	bit 2	bit 1	
0	0	0	Indicate no messages
0	0	1	Reserved
0	1	0	Indicate all SMS messages
0	1	1	Indicate SMS messages marked as TE-specific
1	0	0	Indicate all CBS messages
1	0	1	Indicate CBS messages marked as TE-specific
1	1	0	Indicate all CBS and SMS messages
1	1	1	Indicate SMS and CBS messages marked as TE-specific

Bit 4 shows whether or not to indicate SMS reports:

bit 4	
0	Do not indicate SMS reports
1	Indicate SMS reports

TABLE 5.4/GSM 07.05   Indication Type information element

5.2.4 Insert Type

The Insert Type tells the MT what to do with the short message arriving from the TE.

The Insert Type information element is coded as shown in figure 5.5/GSM 07.05 and table 5.5/GSM 07.05

```
    8     7     6     5     4     3     2     1
  ┌─────┬───────────────────────────────────────┐
  │  0  │  0     0     0     0     0     1     1  │  octet 1
  │     │    Insert Type info element identifier │
  ├─────┴────────────────────────────┬──────────┤
  │  0     0     0     0     0     0  │  Insert  │
  │            Reserved              │Type value│  octet 2
  └──────────────────────────────────┴──────────┘
```

FIGURE 5.5/GSM 07.05 Insert Type information element

```
┌──────────────────────────────────────────────────────────────┐
│          Insert Type value (octet 2).                        │
│                                                              │
│  The insert type is coded as follows:                        │
│                                                              │
│  bit 2     bit 1                                             │
│  0         0           Reserved                             │
│  0         1           Store the short message in the MT     │
│  1         0           Send the short message over the air   │
│  1         1           Store the short message in the MT and send it over the │
│                        air                                  │
└──────────────────────────────────────────────────────────────┘
```

TABLE 5.5/GSM 07.05   Insert Type information element

5.2.5 Short Message Index

The Short Message Index provides information about each individual short message currently stored in the MT. Two types of Short Message index are provided; one for SMS and one for CBS.

The Short Message Index (SMS) information element is coded as shown in figure 5.6/GSM 07.05 and table 5.6/GSM 07.05.

The Short Message Index (CBS) information element is coded as shown in figure 5.7/GSM 07.05 and table 5.7/GSM 07.05.

```
    8     7     6     5     4     3     2     1
  ┌─────┬───────────────────────────────────────┐
  │  0  │  0     0     0     0     1     0     0  │  octet 1
  │     │ Short Message Index (SMS) info element id│
  ├─────┴───────────────────────────────────────┤
  │        Length of Short Message Index         │  octet 2
  ├──────────────────────────────────────────────┤
  │        Short Message Reference value         │  octet 3
  ├──────────────────────────────────────────────┤
  │          Short Message Status                │  octet 4
  ├──────────────────────────────────────────────┤
  │          Service Centre Address              │  octets
  │                                              │  5-n
  ├──────────────────────────────────────────────┤
  │        Short Message Header (SMS)            │  octets
  │                                              │  n+1 - n+31
  └──────────────────────────────────────────────┘
```

FIGURE 5.6/GSM 07.05 Short Message Index (SMS) information element

n can take a value between 5 and 18 (inclusive)

Short Message Reference value (octet 3).

The Short Message Reference value is coded as specified in table 5.2/GSM 07.05.

Short Message Status (octet 4).

The Short Message Status is coded as follows:

```
8   7   6   5   4   3   2   1
0   0   0   0   0   0   0   0             Not read/not sent
0   0   0   0   0   0   0   1             Read/Sent
```

All other values are reserved.

If the message is mobile originated then bit 1 indicates whether the message has been sent to the network. If the message is mobile terminated then bit 1 indicates whether the message has been read.

Service Centre Address (Octets 5-n).

The Service Centre Address is coded as the RP-Origination or RP-Destination address specified in TS GSM 04.11. If the short message is mobile originated, the address will be the RP-Destination address. If the short message is mobile terminated, the address will be the RP-Origination address. The address is of variable length, 1-13 octets.

Short Message Header (SMS) (Octets n+1 - n+31).

The Short Message Header (SMS) is coded as a TPDU as described in TS GSM 03.40. In the case of SMS-DELIVER or SMS-SUBMIT, the TP-User-Data is not included, but the TP-User-Data-Length is included. The Short Message Header is of variable length, 6-31 octets.

TABLE 5.6/GSM 07.05   Short Message Index (SMS) information element

```
   8       7      6       5       4       3       2       1
┌───────┬────────────────────────────────────────────────────┐
│   0   │  0     0      0       0       1       0       1     │   octet 1
│       │  Short Message Index (CBS) info element id          │
├───────┴────────────────────────────────────────────────────┤
│            Short Message Reference value                    │   octet 2
├─────────────────────────────────────────────────────────────┤
│                                                             │   octets
│            Short Message Header (CBS)                       │   3-8
└─────────────────────────────────────────────────────────────┘
```

FIGURE 5.7/GSM 07.05 Short Message Index (CBS) information element

Short Message Reference value (octet 2).

The Short Message Reference value is coded as specified in table 5.2/GSM 07.05.

Short Message Header (CBS) (Octets 3-8).

The Short Message Header (CBS) is coded as described in TS GSM 03.41, including SEQUENCE NUMBER, MESSAGE IDENTIFIER, ALPHABET IDENTIFIER and PAGE PARAMETER, but excluding the characters of the message.

TABLE 5.7/GSM 07.05   Short Message Index (CBS) information element

5.2.6 Short Message Data

The Short Message Data information element is a copy of a short message currently stored in the MT. Two types of Short Message Data information element are provided; one for SMS and one for CBS.

The Short Message Data (SMS) information element is coded as shown in figure 5.8/GSM 07.05 and table 5.8/GSM 07.05.

The Short Message Data (CBS) information element is coded as shown in figure 5.9/GSM 07.05 and table 5.9/GSM 07.05.

```
    8     7     6     5     4     3     2     1
 ┌─────┬───────────────────────────────────────┐
 │  0  │  0    0    0    0    1    1    0        │ octet 1
 │     │  Short Message Data (SMS) info element id│
 ├─────┴───────────────────────────────────────┤
 │        Length of Short Message Data          │ octet 2
 ├──────────────────────────────────────────────┤
 │        Short Message Reference value         │ octet 3
 ├──────────────────────────────────────────────┤
 │          Short Message Status                │ octet 4
 ├──────────────────────────────────────────────┤
 │          Service Centre Address              │ octets
 │                                              │ 5-n
 ├──────────────────────────────────────────────┤
 │          Short Message (SMS)                 │ octets
 │                                              │ n+1-n+164
 └──────────────────────────────────────────────┘
```

FIGURE 5.8/GSM 07.05 Short Message Data (SMS) information element

n can take a value between 5 and 18 (inclusive)

Short Message Reference value (octet 3).

The Short Message Reference value is coded as specified in table 5.2/GSM 07.05.

Short Message Status (octet 4).

The Short Message Status is coded as follows:

```
8  7  6  5  4  3  2  1
0  0  0  0  0  0  0  0      Not read/not sent
0  0  0  0  0  0  0  1      Read/Sent
```

All other values are reserved.

If the message is mobile originated then bit 1 indicates whether the message has been sent to the network. If the message is mobile terminated then bit 1 indicates whether the message has been read.

Service Centre Address (Octets 5-n).

The Service Centre Address is coded as the RP-Origination-Address or RP-Destination Address specified in TS GSM 03.40.
If the short message is mobile originated, the address will be the RP-Destination address. If the short message is mobile terminated, the address will be the RP-Origination Address. The address is of variable length, 1-13 octets.

Short Message (SMS) (Octets n+1 - n+164).

The Short Message (SMS) is coded as a TPDU as described in GSM 03.40.
The Short Message is of variable length, 6-164 octets.

TABLE 5.8/GSM 07.05   Short Message (SMS) information element

```
 8      7      6      5      4      3      2      1
┌────┬──────────────────────────────────────────────┐
│ 0  │  0      0      0      0      1      1      1   │  octet 1
│    │  Short Message Data (CBS) info element id     │
├────┴──────────────────────────────────────────────┤
│         Short Message Reference value              │  octet 2
├────────────────────────────────────────────────────┤
│              Short Message (CBS)                   │  octets
│                                                    │  3-90
└────────────────────────────────────────────────────┘
```

FIGURE 5.9/GSM 07.05 Short Message Data (CBS) information element

Short Message Reference value (octet 2).

The Short Message Reference value is coded as specified in table 5.2/GSM 07.05.

Short Message (CBS) (Octets 3-90).

The Short Message (CBS) is coded as described in TS GSM 03.41, including SEQUENCE NUMBER, MESSAGE IDENTIFIER, ALPHABET IDENTIFIER, PAGE PARAMETER and CHARACTERS OF THE MESSAGE.

TABLE 5.9/GSM 07.05   Short Message Data (CBS) information element

5.2.7 Cause

The Cause information element provides more detail as to why an error has occurred.
The Cause information element is coded as shown in figure 5.10/GSM 07.05 and table 5.10/GSM 07.05.

```
    8     7     6     5     4     3     2     1
 ┌─────┬───────────────────────────────────────────┐
 │  0  │  0     0     0     1     0     0     0      │  octet 1
 │     │  Cause information element identifier      │
 ├─────┼───────────────────────────────────────────┤
 │  0  │                                            │
 │ ext │             Cause value                    │  octet 2
 ├─────┴───────────────────────────────────────────┤
 │               04.11 RP-Cause value               │  octet 3
 └──────────────────────────────────────────────────┘
```

FIGURE 5.10/GSM 07.05   Cause information element

Cause value (octet 2).

The cause is coded as follows:

8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	No such message - no short message exists with the provided shortmessage reference
0	0	0	0	0	0	0	1	No memory - the short message cannot be stored due to lack of memory
0	0	0	0	0	0	1	0	No air interface - submission of the short message cannot be attempted because the mobile is out of coverage
0	0	0	0	0	0	1	1	Receiving entity busy - the request was notfulfilled because the Receiving entity is busy on another task
0	0	0	0	0	1	0	0	Command not understood - error in the coding of the command, or command belongs to higher version of protocol of protocol than that implemented
0	0	0	0	0	1	0	1	Incoming data call - Incoming data call forces MT to exit from SMS mode
0	0	0	0	0	1	1	0	User-invoked exit - User has taken MT out of SMS by MMI
1	0	0	0	0	1	1	1	Message Transfer failed - The SMS transfer to the SC failed and the 04.11 error cause is provided in octet 3

All other values are reserved.

04.11 RP-Cause value (octet 3)

If this element is included then bit 8 of octet 2 is set to '1'. The error cause included in the RP-Cause over the air interface is directly mapped into this element. This element is only included if the MT attempts to send a short message to the network and that send attempt fails.

TABLE 5.10/GSM 07.05 Cause information element

5.2.8   Index Count

The Index Count identifies the number of short message indices contained in a MESSAGE LIST response from the MT to the TE. It is an 8 bit number.

The Index Count information element is coded as shown in figure 5.11/GSM 07.05 and table 5.11/GSM 07.05.

```
  8      7      6      5      4      3      2      1
┌──────┬──────────────────────────────────────────────┐
│  0   │  0     0     0     1     0     0     1    │ octet 1
│      │ Index Count information element ident         │
├──────┴──────────────────────────────────────────────┤
│              Index Count value                       │ octet 2
└──────────────────────────────────────────────────────┘
```
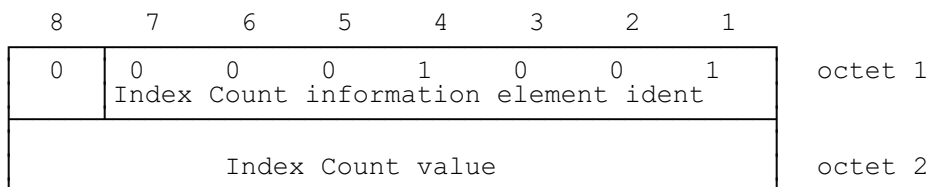
FIGURE 5.11/GSM 07.05   Index Count information element

> Index Count value (octet 2).
>
> In the Index Count field bit 8 of octet 2 is the most significant bit and bit 1 of octet 2 is the least significant bit.

TABLE 5.11/GSM 07.05 Index Count information element

5.2.9   CBS Transfer Type

The CBS Transfer Type indicates to the MT which CBS messages are required to be transferred to the TE.

The CBS Transfer Type information element is coded as shown in figure 5.12/GSM 07.05 and table 5.12/GSM 07.05.

```
  8      7      6      5      4      3      2      1
┌──────┬──────────────────────────────────────────────┐
│  0   │  0     0     0     1     0     1     0   │ octet 1
│      │ CBS Transfer Type info element ident          │
├──────┬──────┬──────┬──────┬──────┬──────┬────────────┤
│  0      0     0      0      0      0   │ CBS Txfr     │
│            Reserved                    │ Type value   │ octet 2
└────────────────────────────────────────┴────────────┘
```

FIGURE 5.12/GSM 07.05   CBS Transfer Type information element

> CBS Txfr Type value (octet 2).
>
> The CBS txfr type is coded as follows:
>
> ```
> bit 2 bit 1
> 0     0     Transfer no CBS messages
> 0     1     Transfer CBS messages marked as TE-specific
> 1     0     Reserved
> 1     1     Transfer all CBS messages
> ```

TABLE 5.12/GSM 07.05 CBS Transfer Type information element

5.2.10 Page Index

The Page Index indicates to the MT which Page of SMS Indices is required to be transferred. It also indicates to the TE which Page of SMS Indices is being transferred.

The Page Index information element is coded as shown in figure 5.13/GSM 07.05 and table 5.13/GSM 07.05.

```
 8     7     6     5     4     3     2     1
┌─────┬───────────────────────────────────────┐
│  0  │  0     0     0     1     0     1     1 │  octet 1
│     │    Page  Index info element ident      │
├─────┴─────┬─────────────────────────────────┤
│  0     0  │        Page  Index value         │
│  Reserved │                                  │  octet 2
└───────────┴─────────────────────────────────┘
```
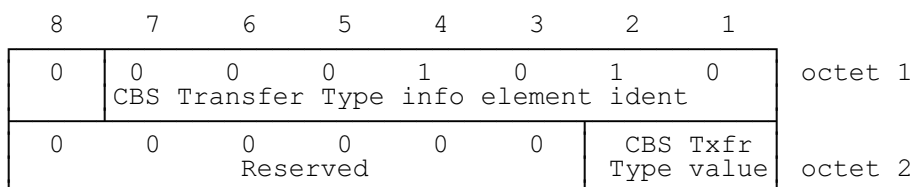
FIGURE 5.13/GSM 07.05   Page Index information element

> Page Index value (octet 2).
>
> In the Page Index field bit 6 of octet 2 is the most significant bit and bit 1 of octet 2 is the least significant bit. The Page Index can have a value from 1 to 51.

TABLE 5.13/GSM 07.05 Page Index information element

5.2.11 Last Short Message

The Last Short Message field indicates to the TE the highest value of Message Reference which points to a valid message stored in the MT. The value 0 signifies that there are no short messages stored in the MT.

The Last Short Message information element is coded as shown in figure 5.14/GSM 07.05 and table 5.14/GSM 07.05.

```
 8     7     6     5     4     3     2     1
┌─────┬───────────────────────────────────────┐
│  0  │  0     0     0     1     1     0     0 │  octet 1
│     │  Last Short Message info element ident │
├─────┴─────────────────────────────────────────┤
│          Last Short Message value              │
│                                                │  octet 2
└────────────────────────────────────────────────┘
```

FIGURE 5.14/GSM 07.05   Last Short Message information element

> Last Short Message value (octet 2).
>
> In the Last Short Message field bit 8 of octet 2 is the most signigicant bit and bit 1 of octet 2 is the least significant bit. The Last Short Message can have a value from 0 to 255.

TABLE 5.14/GSM 07.05 Last Short Message information element

5.2.12   Confirm Type

The Confirm Type field indicates the message to which the REQUEST CONFIRM is a response.

The Confirm Type information element is coded as shown in figure 5.15/GSM 07.05 and table 5.15/GSM 07.05.
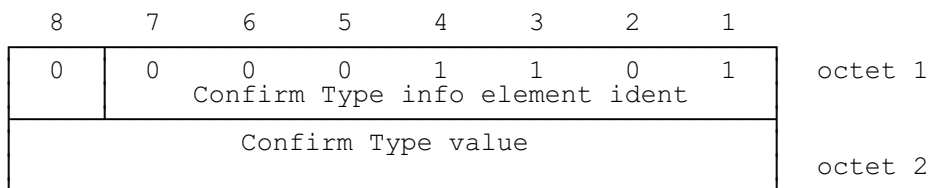
```
   8       7       6       5       4       3       2       1
┌───────┬───────────────────────────────────────────────────┐
│   0   │   0       0       0       1       1       0       1 │   octet 1
│       │       Confirm Type info element ident              │
├───────┴───────────────────────────────────────────────────┤
│              Confirm Type value                            │
│                                                            │   octet 2
└────────────────────────────────────────────────────────────┘
```

FIGURE 5.15/GSM 07.05   Confirm Type information element

```
┌──────────────────────────────────────────────────────────────────────────────┐
│          Confirm Type value (octet 2).                                         │
│                                                                                │
│   The Confirm Type is coded as follows:                                        │
│                                                                                │
│   8   7   6   5   4   3   2   1                                                 │
│   0   0   0   0   0   0   0   0      Reserved                                   │
│                                                                                │
│   0   0   0   0   0   0   0   1      Confirm   request   to   transfer  incoming│
│                                      SMS messages                              │
│                                                                                │
│   0   0   0   0   0   0   1   0      Confirm   request   to   transfer  incoming│
│                                      CBS messages                              │
│                                                                                │
│   0   0   0   0   0   0   1   1      Confirm   request   to   indicate   arrival of│
│                                      messages in MT                            │
│                                                                                │
│   0   0   0   0   0   1   0   0      Confirm   request   to   attempt   to  send│
│                                      short   message  (actual   send  is confirmed│
│                                      later: see section 3.3)                   │
│                                                                                │
│   All other values are reserved.                                               │
└──────────────────────────────────────────────────────────────────────────────┘
```

TABLE 5.15/GSM 07.05 Confirm Type information element

5.2.13   TP-Failure Cause

This optional field is present if provided by the Relay Layer. The TP-Failure Cause is provided from the Service Centre and indicates to the TE the reason why the delivery of the message was unsuccsessful. The TP-Failure cause information element is coded as shown in figure 5.16/GSM 07.05 and table 5.16/GSM 07.05.
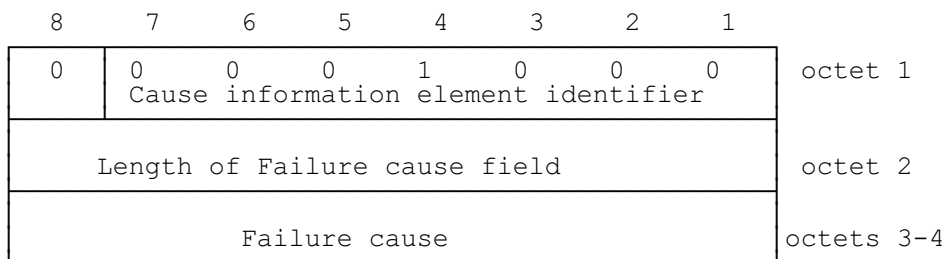
```
   8       7       6       5       4       3       2       1
┌───────┬───────────────────────────────────────────────────┐
│   0   │   0       0       0       1       0       0       0 │   octet 1
│       │       Cause information element identifier          │
├───────┴───────────────────────────────────────────────────┤
│          Length of Failure cause field                     │   octet 2
├────────────────────────────────────────────────────────────┤
│              Failure cause                                  │   octets 3-4
└────────────────────────────────────────────────────────────┘
```

FIGURE 5.16/GSM 07.05   TP-Failure Cause information element

Failure cause (octet 3-4)

The failure cause contained in this field is directly mapped from the TP-Failure Cause (TP-FCS) field of the SMS-SUBMIT-REPORT message defined in GSM 03.40.

TABLE 5.16/GSM 07.05 TP-Failure Cause information element

6   CHARACTER ORIENTATED PROTOCOL

The character orientated protocol allows a non-intelligent asynchronous DTE to be used for sending short messages and displaying short messages and cell broadcast messages.

The underlying concept of the character orientated protocol is to enhance the keypad and display capabilities of the MT without the need for specifically written software in the DTE. In consequence, the character orientated protocol offers restricted functionality compared to the block mode orientated protocol described in earlier sections of this Technical Specification.

In the following description a number of abbreviations are used to ease explanation:

< >	for descriptive purposes only
SPACE	CCITT IA5 'space' character
C/R	CCITT IA5 carriage return character
L/F	CCITT IA5 line feed character

6.1   Entry into the SMS/CBS mode character orientated protocol

The conditions for beginning the SMS/CBS mode are described in section 2.1,

i.e. The TE shall send to the MT the command:

SMS<SPACE>C<C/R>

The valid or invalid responses by the MT to such a command are also described in section 2.1.

6.2   Returning from SMS/CBS mode character orientated protocol

The command END SMS MODE described in section 2.2 is, in the character orientated protocol mode, a CCITT IA5 character string in the following format.

END<SPACE><SMS><SPACE><MODE><C/R>

If the syntax of the command is correct, the MT shall respond with VAL together with delimeters as described in V25 bis.

If the syntax of the command is incorrect, the MT shall respond with INV together with delimeters as described in V25 bis.

6.3   SMS/CBS mode

Once in the SMS/CBS mode a number of commands are available to the TE.

6.3.1   Send Short Message

The format of the send short message command is as follows:

SEND<SPACE><SC ADDRESS>,<DESTINATION ADDRESS>,<SHORT MESSAGE>

where

SEND is a CCITT character string

<SC ADDRESS> is optional and comprises <TYPE OF ADDRESS><SPACE><ADDRESS VALUE> as described in GSM 03.40.

<DESTINATION ADDRESS> is optional and comprises

<TYPE OF ADDRESS><SPACE><ADDRESS VALUE> as described in GSM 03.40

SHORT MESSAGE comprises a 7 bit encoded plus parity CCITT IA5 character string of the short message. The MT will ignore the parity bit set by the TE.

6.3.1.1 Options

The <SC ADDRESS> and <DESTINATION ADDRESS> are optional. When they are to be omitted from the command then the comma which normally follows it must be present.

eg 1   SEND<SPACE>,<DESTINATION ADDRESS>,<SHORT MESSAGE>...

In this example, the SC ADDRESS is omitted.

eg 2   SEND<SPACE>,,<SHORT MESSAGE>

In this example, both the SC ADDRESS and DESTINATION ADDRESS are omitted.

In either of the above examples, whenever <SC ADDRESS> or <DESTINATION ADDRESS> are omitted, the ADDRESS used will be that which exists in Data Field 42 in GSM 11.11. These, along with other parameters associated with the short message service, may be edited as described in GSM 07.06.

Where <SC ADDRESS> or <DESTINATION ADDRESS> are to be entered in the command then <TYPE OF ADDRESS> comprises two CCITT IA5 characters representing the hexadecimal value of <TYPE OF ADDRESS> (TON & NPI) as described in GSM 03.40.

eg 91 will represent an international number (TON) conforming to CCITT E163/E164 numbering plan (NPI).

<TYPE OF ADDRESS> is in itself optional and if omitted the MT uses a default value of 91. [The default <TYPE OF ADDRESS> for both <SC ADDRESS> and <DESTINATION ADDRESS> can be independently amended as described in GSM 07.06]. Whenever <TYPE OF ADDRESS> is omitted, a <SPACE> within <DESTINATION ADDRESS> or <SC ADDRESS> fields must not be present. The <SPACE> immediately following SEND must however be present.

The <ADDRESS VALUE> comprises a number of CCITT IA5 characters each character representing a semi octet hexadecimal value.

The MT must make provision for calculating the Address length defined in GSM 03.40.

6.3.1.2 Short message forwarding conditions in the MT

The condition for sending a short message is on receipt of a CCITT IA5 carriage return character which will not be included in the Short message sent accross the air interface.

In the case where the number of CCITT IA5 characters exceeds 160, more than one short message will be sent to the same SC and Destination address. GSM 03.40 cannot however guarantee the order in which they will be received at the destination address.

The MT will check the syntax of the send short message command.

If the syntax is correct, the MT shall respond with VAL together with delimeters as described in V25 bis.

If the syntax is incorrect, the MT shall respond with INV together with delimiters as described in V25 bis.

6.3.1.3   Failure conditions

Once a short message has been validated for correct syntax it is sent by the MT across the air interface to the designated service centre.

If for any reason, the short message is not acknowledged as having been received by the SC after any retry attempts by the MT, then the MT shall send a call failure indication to the TE in the format described in V25 bis but where the reason for failure is NA (Negative Acknowledged).

6.3.2   Requesting SMS messages

As described in section 3.2.1, the TE may request the direct transfer of incoming SMS message to the TE.

The command TRANSFER INC SMS described in section 3.2.1 is, in the character orientated protocol mode a CCITT IA5 character string in the following format:

SMS<SPACE>ON<CR>

To disable the direct transfer of short messages the command

SMS<SPACE>OFF<CR>

is sent to the MT.

The syntax of the above commands will be checked and an appropriate VAL or INV response given together with the delimiters as described in V25 bis.

The direct transfer of short messages will automatically cease when the END SMS MODE command is executed as described in section 6.2.

6.3.2.1   Response to SMS Message Request

The MT shall send a requested SMS message to the TE in the following format.

<L/F><C/R><ORIGINATING ADDRESS><SHORT MESSAGE><L/F><C/R>

where <ORIGINATING ADDRESS> comprises <ADDRESS VALUE> as defined in GSM 03.40 sent by the MT in CCITT IA5 7 bit encoded plus parity format, each character representing a semi octet hexadecimal value with the parity bit set to zero (space parity) and

<SHORT MESSAGE> comprises the information content of the short message itself in 7 bit encoded GSM alphabet format as described in GSM 03.40 with an 8th bit present which the MT shall set to zero (space parity).

6.3.3   Requesting CBS messages

As described in section 3.2.2 the TE may request the direct transfer of incoming CBS message to the TE.

The command TRANSFER INC CBS described in section 3.2.2 is, in the character orientated protocol mode a CCITT IA5 character string in the following format:

CBS<SPACE>ON<CR>

To disable the direct transfer of CBS messages the command

CBS<SPACE>OFF<CR>

is sent to the MT.

The syntax of the above commands will be checked and an appropriate VAL or INV response given together with the delimeters as described in V25 bis.

The direct transfer of CBS messages will automatically cease when the END SMS MODE command is executed as described in section 6.2.

6.3.3.1   Response to CBS Message Request

The MT shall send a requested CBS message to the TE in the following format

   <L/F><C/R><CBS MESSAGE><L/F><C/R>

where

CBS MESSAGE is the CBS message information as described in GSM 03.41 sent in 7 bit encoded GSM alphabet as described in GSM 03.41 with an 8th bit present which the MT shall set to zero (space parity).

Annex 1 (informative):   EXAMPLE OF PROCESSING A DATA BLOCK

Example state diagrams for the block receiver

The state diagrams on the following two pages show how the receiver component at the block level could work. In this example the received octets are processed in two stages.

Stage 1 is a low level function which detects the unique start and end markers, and removes any stuffing octets. The results of this stage are passed to stage 2. Any unexpected octet value after a DLE will be indicated as 'abort'.

Stage 2 assembles the message content and the BCS octets, using octets passed from stage 1 and the 'start' and 'end' indications. A 'start' will always reset the process to state 1 from any state. An 'abort' will always cause a return to state 0 where a 'start' will be awaited. When an 'end' is received in state 1, the following two octets are checked as the BCS. If the BCS is correct, the message content is passed to another stage of the receiver for processing of the message content.
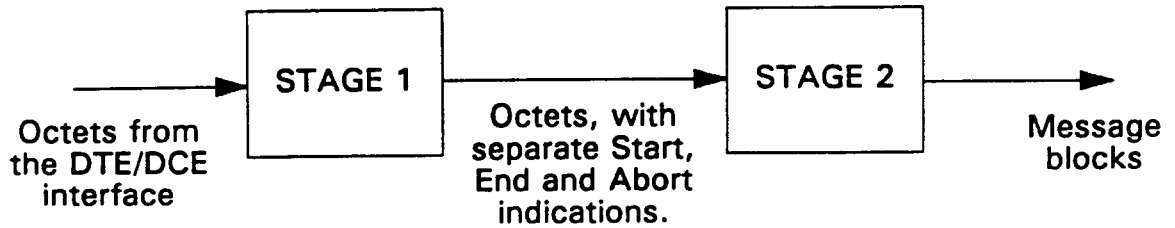
Example of coding and decoding a data block

The last page of this annex shows the coding of an example message at a transmitter, and the decoding stages at a receiver which has the two stages of processing as described above.

In this example, the message content and the BCS both contain an octet with a value of 10 hex. Therefore the message as transmitted over the interface has additional stuffing octets (00 hex) inserted after these octets. The receiver first detects the start and end markers, and removes the stuffing octets. Finally the BCS is checked.

EXAMPLE STATE DIAGRAMS FOR THE BLOCK RECEIVER

The block receiver can be considered as two stages. Stage 1 detects start and end markers, and removes stuffing characters. Stage 2 assembles the received message and checks the BCS.

STATE TRANSITIONS IN STAGE 1
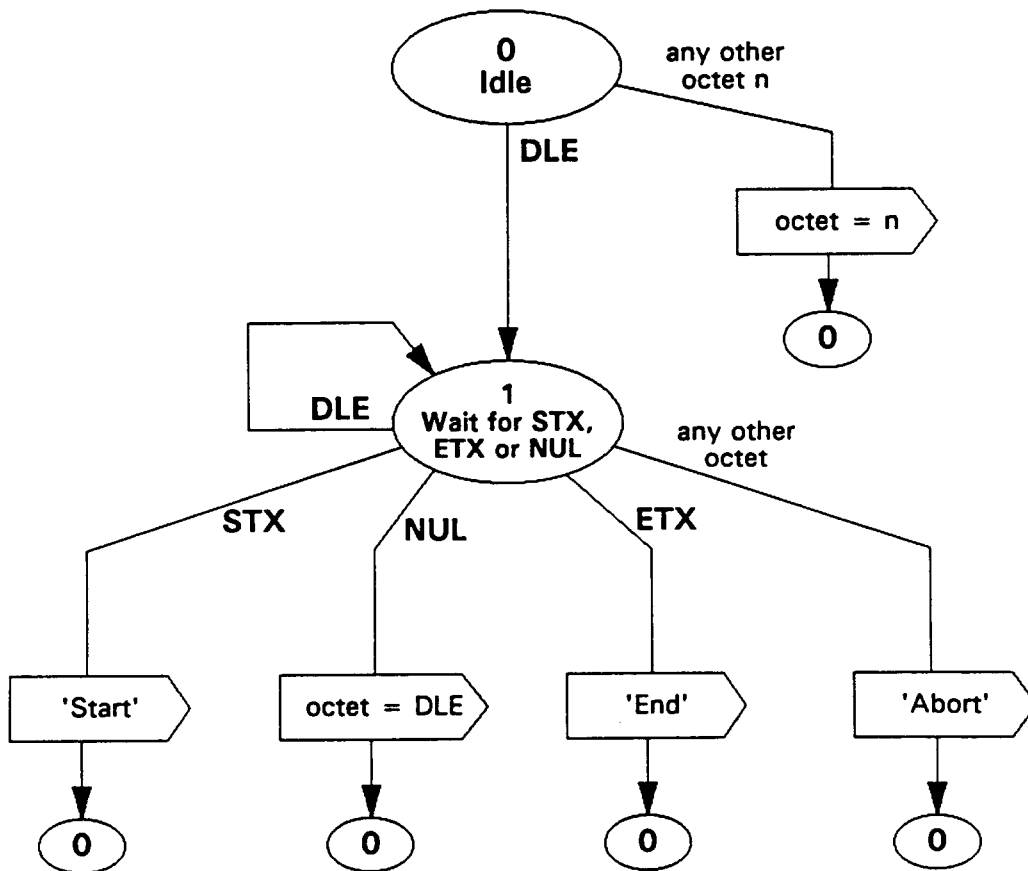
STATE TRANSITIONS IN STAGE 2

Example of coding / decoding a message
at the DTE/DCE interface

Example message to be sent
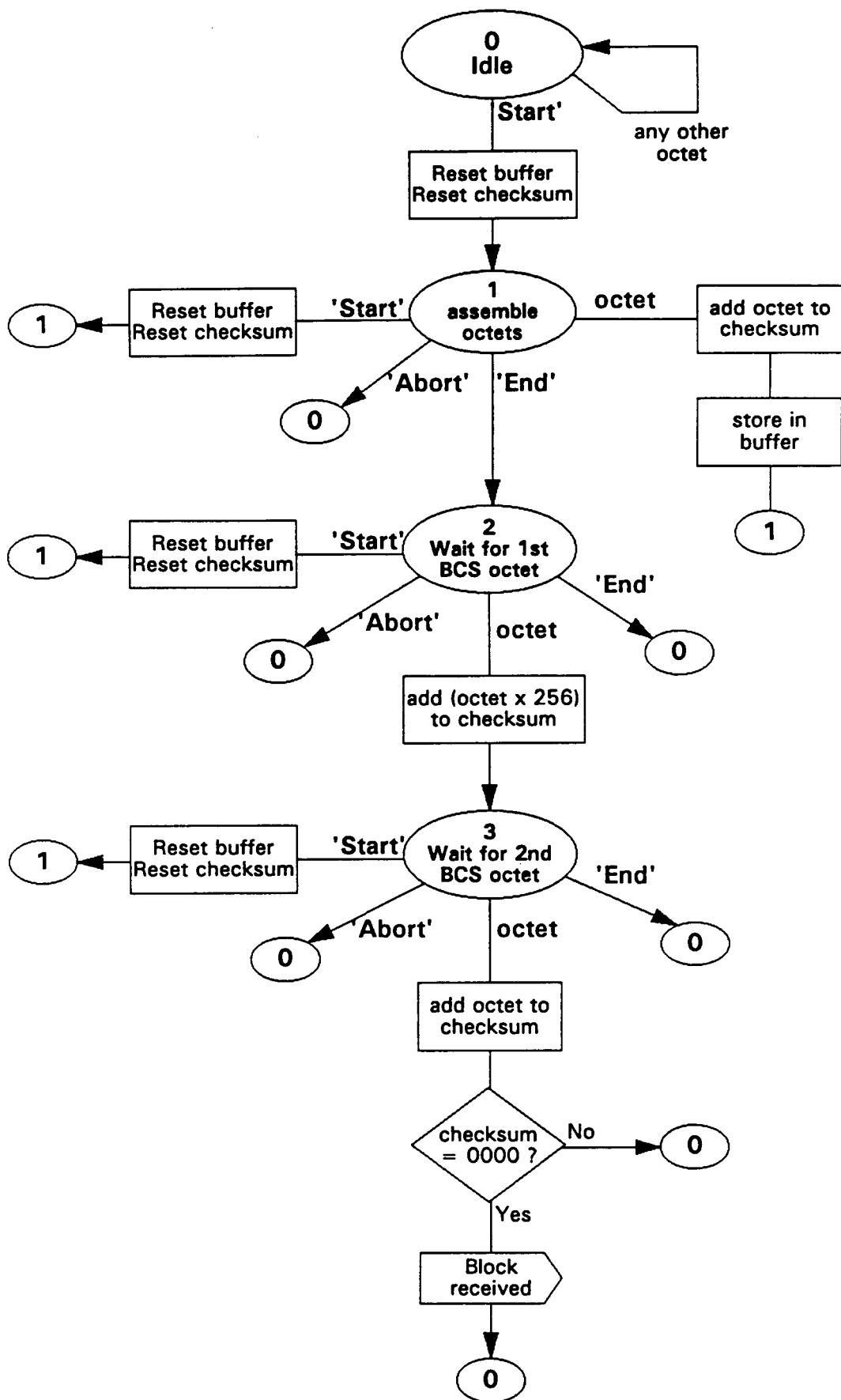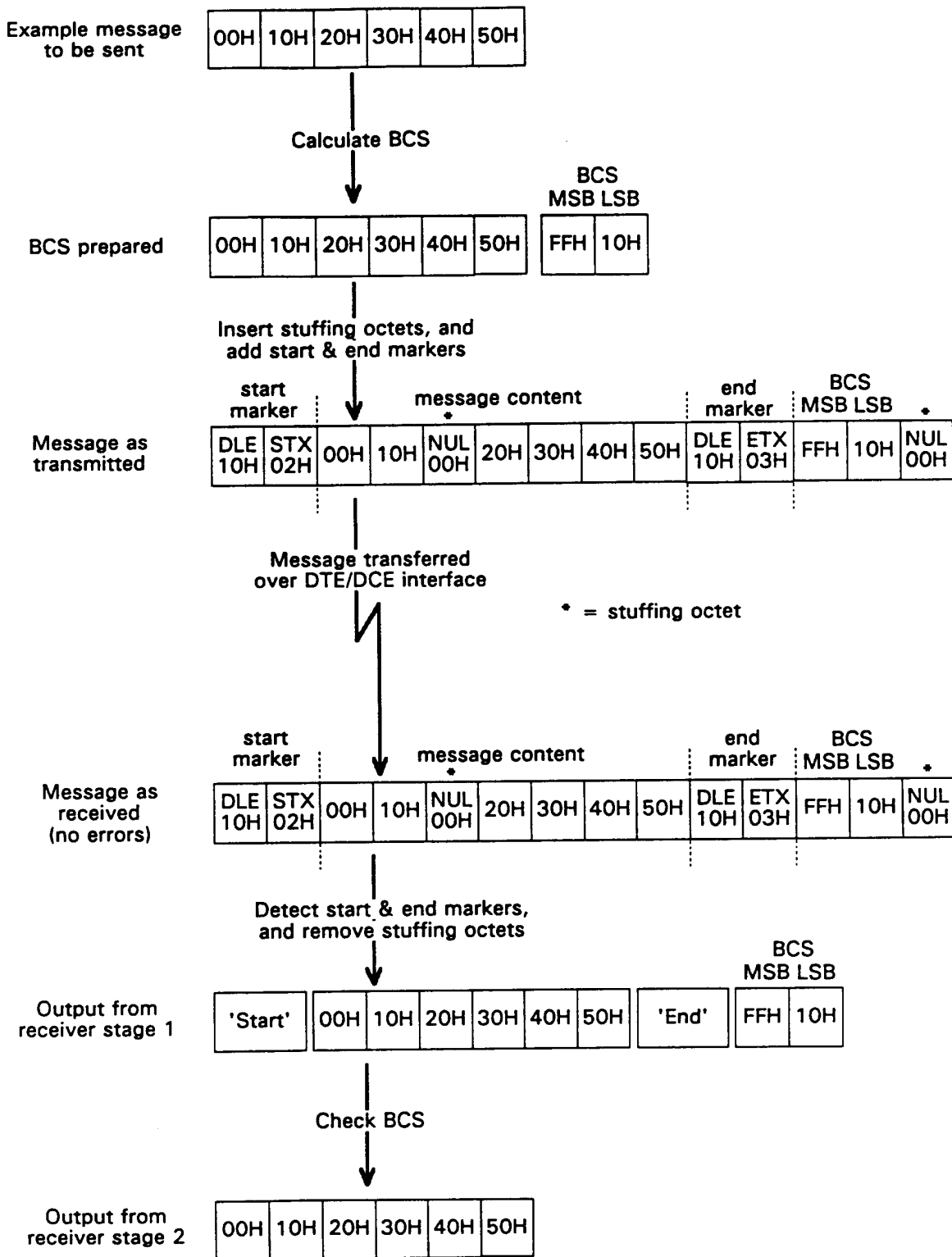
00H	10H	20H	30H	40H	50H

Calculate BCS

BCS
MSB LSB

BCS prepared

00H	10H	20H	30H	40H	50H		FFH	10H

Insert stuffing octets, and
add start & end markers

start marker | message content | end marker | BCS MSB LSB | *

Message as transmitted

DLE 10H	STX 02H	00H	10H	NUL 00H	20H	30H	40H	50H	DLE 10H	ETX 03H	FFH	10H	NUL 00H

Message transferred
over DTE/DCE interface

* = stuffing octet

start marker | message content | end marker | BCS MSB LSB | *

Message as received (no errors)

DLE 10H	STX 02H	00H	10H	NUL 00H	20H	30H	40H	50H	DLE 10H	ETX 03H	FFH	10H	NUL 00H

Detect start & end markers,
and remove stuffing octets

BCS
MSB LSB

Output from receiver stage 1

'Start'		00H	10H	20H	30H	40H	50H		'End'		FFH	10H

Check BCS

Output from receiver stage 2

00H	10H	20H	30H	40H	50H

History

Document history	
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