3GPP TSG-T (Terminals) Meeting #7
Madrid, Spain, 13 - 15 March, 2000

Tdoc TP-000043

Document

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.040	**CR**		Current Version:	3.3.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: T#7 *list expected approval meeting # here ↑*	for approval	X	strategic	X	*(for SMG use only)*
	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: Nokia **Date:** 13.03.2000

Subject: Enhancement of the Message Content in SMS

Work item: Messaging (Short Message Service (SMS))

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature	X		Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

This CR proposes an enhancement of the message-contents in SMS. At the moment SMS users are not able to send more than plain text to each other. This proposal provides the users to make more exciting messages with features like formatting the text, sounds, small pictures and simple animations.

This enhancement is based on standard mechanisms in GSM and is therefore backward compatible with older terminals. Terminals that do not have these extra features will still be able to present the text but not the extra information (e.g. formatting, pictures).

Clauses affected: 2, 3.10, 9.2.3.24, 9.2.3.24.10

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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<--------- double-click here for help and instructions on how to create a CR.

2 Normative 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

[2] GSM 02.03: "Digital cellular telecommunication system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[3] 3G TS 22.004: "General on supplementary services".

[4] 3G TS 22.041: " Operator determined barring".

[5] GSM 03.02: "Digital cellular telecommunication system (Phase 2+); Network architecture".

[6] 3G TS 23.008: "Organization of subscriber data".

[7] 3G TS 23.011: "Technical realization of supplementary services - General Aspects".

[8] 3G TS 23.015: "Technical realisation of Operator Determined Barring (ODB)".

[9] 3G TS 23.038: "Alphabets and language-specific information".

[10] 3G TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[11] GSM 03.47 (ETR 354): "Digital cellular telecommunication system; Example protocol stacks for interconnecting Service Centre(s) (SC) and Mobile-services Switching Centre(s) (MSC)".

[12] GSM 04.08: "Digital cellular telecommunication system (Phase 2+); Mobile radio interface layer 3 specification".

[13] 3G TS 24.011: "Short Message Service (SMS) support on mobile radio interface".

[14] 3G TS 27.005: "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[15] 3G TS 29.002: "Mobile Application Part (MAP) specification".

[16] GSM 11.11: "Digital cellular telecommunication system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM- ME) interface".

[17] CCITT Recommendation E.164 (Blue Book): "Numbering plan for the ISDN era".

[18] CCITT Recommendation E.163 (Blue Book): "Numbering plan for the international telephone service".

[19] CCITT Recommendation Q.771: "Specifications of Signalling System No.7; Functional description of transaction capabilities".

[20] CCITT Recommendation T.100 (Blue Book): "International information exchange for interactive videotex".

[21] CCITT Recommendation T.101 (Blue Book): "International interworking for videotex services".

[22] CCITT Recommendation X.121 (Blue Book): "International numbering plan for public data networks".

[23] CCITT Recommendation X.400 (Blue Book): "Message handling system and service overview".

[24] ISO/IEC10646, "Universal Multiple-Octet Coded Character Set (USC); UCS2, 16 bit coding".

[25] 3G TS 22.022: "Personalisation of GSM ME Mobile functionality specification - Stage 1".

[26] 3G TS 23.042: "Compression Algorithm for Text Messaging Services"

[27] 3G TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[28] GSM 03.48: "Digital cellular telecommunications system (Phase 2+); Security Mechanisms for the SIM application toolkit; Stage 2"

[29] 3G TR 21.905: "3G Vocabulary".

[30] 3G TS 31.102: "Characteristics of the USIM application"

[31] 3G TS 31.101: "UICC – Terminal interface; Physical and logical characteristics"

[32] 3G TS 22.105: "Services and Service Capabilites"

[33] Infrared Data Association. Specifications for Ir Mobile Communications (IrMC). iMelody.

3.10 Enhanced Messaging Service

The Enhanced Messaging Service (EMS) is based upon the standard SMS, but with formatting added to the text. The formatting permits the message to contain simple animations, small pictures, small melodies and formatting of the text, everything mixed together into one message. This section lists the supported features. The coding mechanisms and formats are specified in section 9.2.3.24.10

3.10.1 Text formatting

The following text formatting features are supported:

Alignment

- Left (default)
- Centre
- Right

Font size

- Normal (default)
- Large
- Small

Style

- Normal (default)
- **Bold**
- *Italic*
- Underlined
- ~~Strikethrough~~

3.10.2 Pictures

It is possible to include either a small (16*16 pixels), large (32*32 pixels) or pictures of variable size. These pictures have neither animation nor grey scales, it is plain black and white. All pictures are user defined.

If multiple pictures are received side by side, then they will be stitched together with no inter-character spacing. If a <CR> is inserted in the middle of multiple pictures, then the left margin of the pictures are vertically aligned. If two pictures that are of the same size are logically separate, they should be separated by a space or other characters. Maximum recommended pictures size usage of this technique : 96x64 (6 large pictures, with a CR in the middle). This unified picture is then formatted as one.

3.10.3 Animations

Predefined

There are number of predefined animations. These animations are not sent as animation over the air interface, only the identification of them. As soon as the position of the animation in the SM data is reached, the animation corresponding to the received number shall be displayed in a manner which is manufacturer specific..

User Defined

The user-defined animations consist of 4 pictures and there are two different sizes of these animations. The picture size of the small animations are 8*8 pixels and the large 16*16 pixels. These animations are sent over the air interface.

3.10.4 Sound

Predefined

There are a number of predefined sounds. These sounds are not transferred over the air interface, only the identification of them. There are 10 different sounds that can be added in the message, and as soon as the sound mark is in focus (on the display), the sound will be played.

User Defined

The sender can define own melodies according to the iMelody format [33]. These melodies are transferred in the SM and can take up to 128 bytes.

9.2.3.9 TP-Protocol-Identifier (TP-PID)

The TP-Protocol-Identifier parameter serves the purposes indicated in subclause 3.2.3. It consists of one octet, and the bits in the octet are used as follows:

The MS shall interpret reserved or unsupported values as the value 00000000 but shall store them exactly as received.

The SC may reject messages with a TP-Protocol-Identifier containing a reserved value or one which is not supported.

bits	usage
7 6	
0 0	Assigns bits 0..5 as defined below
0 1	Assigns bits 0..5 as defined below
1 0	reserved
1 1	Assigns bits 0-5 for SC specific use

In the case where bit 7 = 0 and bit 6 = 0,

bit 5 indicates telematic interworking:
value = 0 : no interworking, but SME-to-SME protocol
value = 1 : telematic interworking

In the case of telematic interworking, the following five bit patterns in bits 4..0 are used to indicate different types of telematic devices:

4.. .0	
00000	implicit - device type is specific to this SC, or can be concluded on the basis of the address
00001	telex (or teletex reduced to telex format)
00010	group 3 telefax
00011	group 4 telefax
00100	voice telephone (i.e. conversion to speech)
00101	ERMES (European Radio Messaging System)
00110	National Paging system (known to the SC)
00111	Videotex (T.100 [20] /T.101 [21])
01000	teletex, carrier unspecified
01001	teletex, in PSPDN
01010	teletex, in CSPDN
01011	teletex, in analog PSTN
01100	teletex, in digital ISDN
01101	UCI (Universal Computer Interface, ETSI DE/PS 3 01-3)
01110..01111	(reserved, 2 combinations)
10000	a message handling facility (known to the SC)
10001	any public X.400-based message handling system
10010	Internet Electronic Mail
10011..10111	(reserved, 5 combinations)
11000..11110	values specific to each SC, usage based on mutual agreement between the SME and the SC (7 combinations available for each SC)
11111	A GSM/UMTS mobile station. The SC converts the SM from the received TP-Data-Coding-Scheme to any data coding scheme supported by that MS (e.g. the default).

If bit 5 has value 1 in an SMS-SUBMIT PDU, it indicates that the SME is a telematic device of a type which is indicated in bits 4..0, and requests the SC to convert the SM into a form suited for that device type. If the destination network is ISDN, the SC must also select the proper service indicators for connecting to a device of that type.

If bit 5 has value 1 in an SMS-DELIVER PDU, it indicates that the SME is a telematic device of a type which is indicated in bits 4..0.

If bit 5 has value 0 in an SMS-DELIVER PDU, the value in bits 4..0 identifies the SM-AL protocol being used between the SME and the MS.

Note that for the straightforward case of simple MS-to-SC short message transfer the Protocol Identifier is set to the value 0.

In the case where bit 7 = 0, bit 6 = 1, bits 5..0 are used as defined below

5 0	
000000	Short Message Type 0
000001	Replace Short Message Type 1
000010	Replace Short Message Type 2
000011	Replace Short Message Type 3
000100	Replace Short Message Type 4
000101	Replace Short Message Type 5
000110	Replace Short Message Type 6
000111	Replace Short Message Type 7
001000..011101	Reserved
011110	Enhanced Message Service (EMS. Refer section 3.10)
011111	Return Call Message
100000..111011	Reserved
111100	ANSI-136 R-DATA
111101	ME Data download
111110	ME De-personalization Short Message
111111	(U)SIM Data download

A short message type 0 indicates that the ME must acknowledge receipt of the short message but may discard its contents.

The Replace Short Message feature is optional for the ME and the (U)SIM but if implemented it shall be performed as described here.

For MT short messages, on receipt of a short message from the SC, the MS shall check to see if the associated Protocol Identifier contains a Replace Short Message Type code.

If such a code is present, then the MS shall check the originating address and replace any existing stored message having the same Protocol Identifier code and originating address with the new short message and other parameter values. If there is no message to be replaced, the MS shall store the message in the normal way. The MS may also check the SC address as well as the Originating Address. However, in a network which has multiple SCs, it is possible for a Replace Message type for a SM to be sent via different SCs and so it is recommended that the SC address should not be checked by the MS unless the application specifically requires such a check.

If a Replace Short Message Type code is not present then the MS shall store the message in the normal way.

In MO short messages the SC reacts similarly but only the address of the originating MS or any other source is checked

The Enhanced Message Service PID value shall be set in a MO enhanced short message unless there is a need to set the PID to any other value (e.g for telematic interworking). In the event where the message contains one or more IE that could not be understood by the receiving SME, this PID value may be used to assist the receiving SME and/or the SMSC to identify such a message (e.g for diagnostic purposes). It is not a mandatory requirement for the SMSC or receiving SME to process this PID value or for the SMSC to pass the value to the receiving SME.

A Return Call Message indicates to the MS to inform the user that a call (e.g. a telephone call) can be established to the address specified within the TP-OA. The RP-OA contains the address of the SC as usual. The message content (if present) gives displayable information (e.g. the number of waiting voice messages). The message is handled in the same way as all other messages of the Replace Short Message Types.

The ME De-personalization Short Message is a ME-specific message which instructs the ME to de-personalities the ME (see 3G TS 22.022 [25]). The TP-DCS shall be set to Uncompressed, Default Alphabet, and Message Class 1 (ME-specific), which corresponds to a bit coding of 00010001. The TP-UD field contains de-personalization information coded according to 3G TS 22.022 [25]. This information shall not be displayed by an ME which supports the scheme. The acknowledgement to this message is a SMS-DELIVER-REPORT for RP-ACK in which the TP-User-Data shall be coded according to 3G TS 22.022 [25].

(U)SIM Data download is a facility whereby the ME must pass the short message in its entirety including all SMS elements contained in the SMS deliver to the (U)SIM using the mechanism described in GSM TS 11.11 [16] and 3G TS

31.102 [30]. The DCS shall be set to 8 bit message class 2 (either bit coding 1111 0110 or 00010110). The entire user data field is available for (U)SIM Data download. If the DCS is not set to 8-bit message class 2 then the message shall be handled in the normal way by the ME.

ME Data download is a facility whereby the ME shall process the short message in its entirety including all SMS elements contained in the SMS deliver to the ME. The DCS shall be set to message class 1. The entire user data field is available for ME data download.

ANSI-136 R-DATA is a facility whereby the ME must pass the short message in its entirety, including all elements contained in the SMS DELIVER, to the (U)SIM using the mechanism described in GSM TS 11.14 [16] and 3G TS 31.102 [30]. The DCS shall be set to 8-bit message class 2 (either bit coding 11110110 or 00010110). If the DCS is not set to 8-bit message class 2 then the message shall be handled in the normal way by the ME.

9.2.3.24 TP-User Data (TP-UD)

The length of the TP-User-Data field is defined in the PDU's of the SM-TL (see subclause 9.2.2).

The TP-User-Data field may comprise just the short message itself or a Header in addition to the short message depending upon the setting of TP-UDHI.

Where the TP-UDHI value is set to 0 the TP-User-Data field comprises the short message only, where the user data can be 7 bit (default alphabet) data, 8 bit data, or 16 bit (UCS2 [24]) data.

Where the TP-UDHI value is set to 1 the first octets of the TP-User-Data field contains a Header in the following order starting at the first octet of the TP-User-Data field.

Irrespective of whether any part of the User Data Header is ignored or discarded, the MS shall always store the entire TPDU exactly as received.

FIELD	LENGTH
Length of User Data Header	1 octet
Information-Element-Identifier "A"	1 octet
Length of Information-Element "A"	1 octet
Information-Element "A" Data	1 to "n" octets
Information-Element-Identifier "B"	1 octet
Length of Information-Element "B"	1 octet
Information-Element "B" Data	1 to "n" octets
Information-Element-Identifier "n"	1 octet
Length of Information-Element "n"	1 octet
Information-Element "n" Data	1 to "n" octets

The diagram below shows the layout of the TP-User-Data-Length and the TP-User-Data for uncompressed GSM 7 bit default alphabet data. The UDHL field is the first octet of the TP-User-Data content of the Short Message.

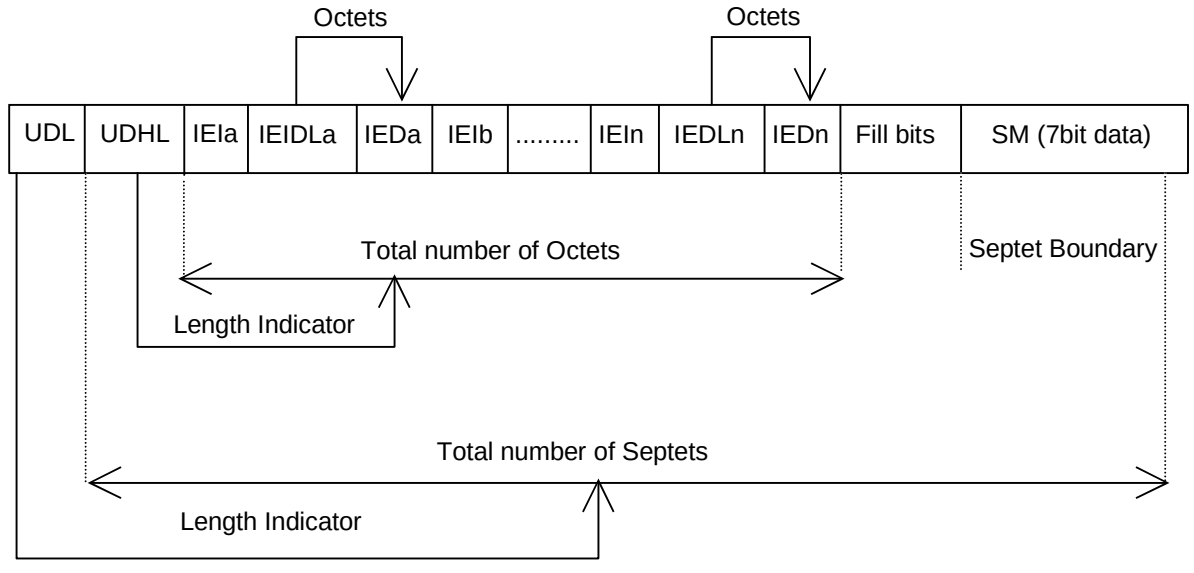

Figure 9.2.3.24 (a)

The diagram below shows the layout of the TP-User-Data-Length and the TP-User-Data for uncompressed 8 bit data or uncompressed UCS2 data. The UDHL field is the first octet of the TP-User-Data content of the Short Message.

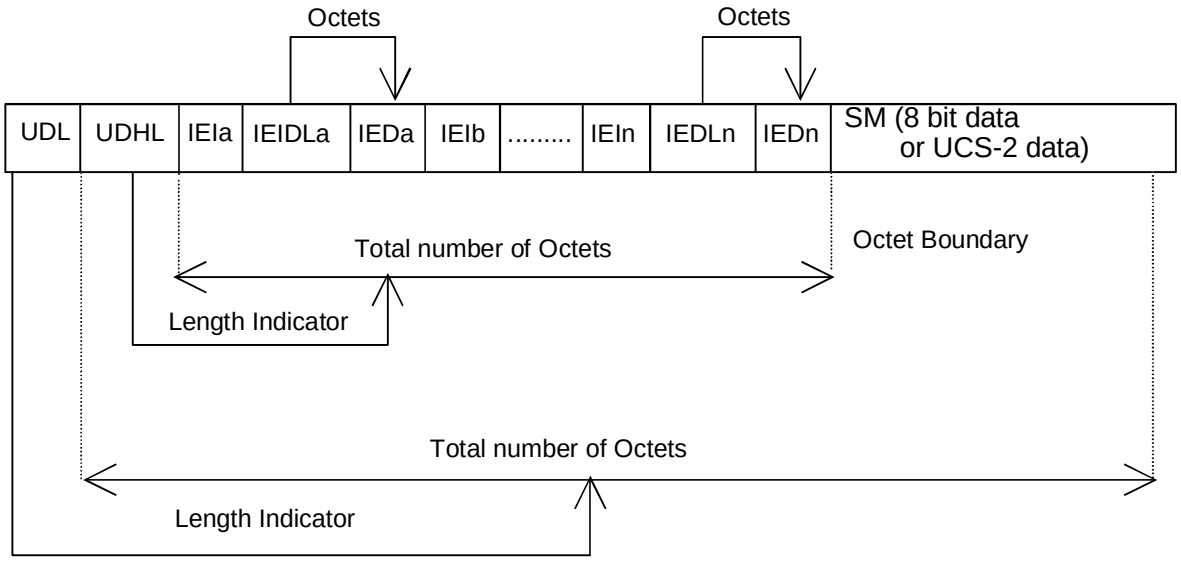

Figure 9.2.3.24 (b)

The diagram below shows the layout of the TP-User-Data-Length and the TP-User-Data for compressed GSM 7 bit default alphabet data, compressed 8 bit data or compressed UCS2 data. The UDHL field is the first octet of the TP-User-Data content of the Short Message.

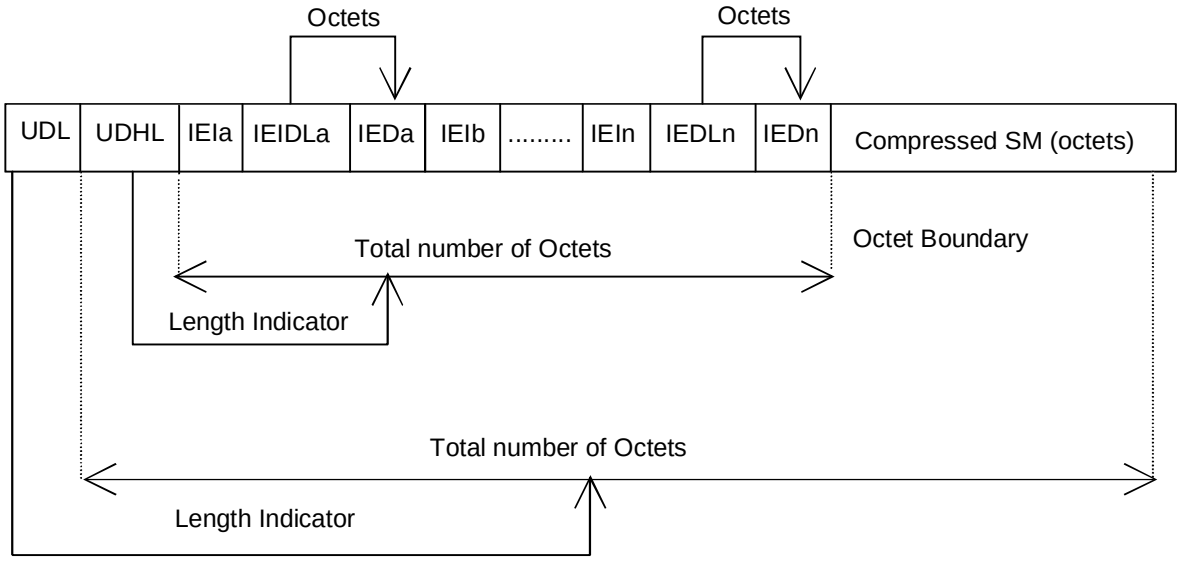

Figure 9.2.3.24 (c)

The definition of the TP-User-Data-Length field which immediately precedes the "Length of User Data Header" is unchanged and shall therefore be the total length of the TP-User-Data field including the Header, if present. (see 9.2.3.16)

The "Length-of-Information-Element" fields shall be the integer representation of the number of octets within its associated "Information-Element-Data" field which follows and shall not include itself in its count value.

The "Length-of-User-Data-Header" field shall be the integer representation of the number of octets within the "User-Data-Header" information fields which follow and shall not include itself in its count or any fill bits which may be present (see text below).

Information Elements may appear in any order and need not necessarily follow the order used in this specification. If Information Elements are duplicated (either with the same or different content) then the contents of the last occurrence

of the Information Element shall be used. If the length of the User Data Header overall is such that there appear to be too few or too many octets in the final Information Element then the whole User Data Header shall be ignored.

If any reserved values are received within the content of any Information Element then that part of the Information Element shall be ignored.

The Information Element Identifier octet shall be coded as follows:

VALUE (hex)	MEANING
00	Concatenated short messages, 8-bit reference number
01	Special SMS Message Indication
02	Reserved
03	Value not used to avoid misinterpretation as <LF> character
04	Application port addressing scheme, 8 bit address
05	Application port addressing scheme, 16 bit address
06	SMSC Control Parameters
07	UDH Source Indicator
08	Concatenated short message, 16-bit reference number
09	Wireless Control Message Protocol
0A	Text Formatting
0B	Predefined Sound
0C	User Defined Sound (iMelody max 128 bytes)
0D	Predefined Animation
0E	Large Animation (16*16 times 4 = 32*4 =128 bytes)
0F	Small Animation (8*8 times 4 = 8*4 =32 bytes)
10	Large Picture (32*32 = 128 bytes)
11	Small Picture (16*16 = 32 bytes)
12	Variable Picture
13-1F	Reserved for future EMS features (see section 3.10)
20~~0A~~ 6F	Reserved for future use
70-7F	(U)SIM Toolkit Security Headers
80 - 9F	SME to SME specific use
A0 - BF	Reserved for future use
C0 - DF	SC specific use
E0 - FF	Reserved for future use

A receiving entity shall ignore (i.e. skip over and commence processing at the next information element) any information element where the IEI is Reserved or not supported. The receiving entity calculates the start of the next information element by looking at the length of the current information element and skipping that number of octets.

The SM itself may be coded as 7, 8 or 16 bit data.

If 7 bit data is used and the TP-UD-Header does not finish on a septet boundary then fill bits are inserted after the last Information Element Data octet up to the next septet boundary so that there is an integral number of septets for the entire TP-UD header. This is to ensure that the SM itself starts on an septet boundary so that an earlier Phase mobile shall be capable of displaying the SM itself although the TP-UD Header in the TP-UD field may not be understood.

It is optional to make the first character of the SM itself a Carriage Return character encoded according to the default 7 bit alphabet so that earlier Phase mobiles, which do not understand the TP-UD-Header, shall over-write the displayed TP-UD-Header with the SM itself.

If 16 bit (USC2) data is used then padding octets are not necessary. The SM itself shall start on an octet boundary.

If 8 bit data is used then padding is not necessary. An earlier Phase mobile shall be able to display the SM itself although the TP-UD header may not be understood.

It is also possible for mobiles not wishing to support the TP-UD header to check the value of the TP-UDHI bit in the SMS-Deliver PDU and the first octet of the TP-UD field and skip to the start of the SM and ignore the TP-UD header.

9.2.3.24.10 Enhanced Messaging Service

9.2.3.24.10.1 EMS Coding

Enhanced Messaging is based on standard mechanism in GSM SMS messaging. The first mechanism is called **user data header** (TP-UDH), which makes it possible to include binary data in a normal SM prior the text message itself (chapter 9.2.3.24). The binary data is in the TP-UD field (message), which means that it steels a part of the 140 bytes.
Each object within the SM shall be identified by a IE in the TP-UD Header. The IE will contain two~~a~~ **octets** (refer to section 9.2.3.24.10.1) that identifies the absolute position of the object within and from the beginning of the SM data. In case of formatting text, ~~an~~ two additional octets will give the number of characters for which the formatting applies. The two octet fields indicating position or length are coded as little endian.

Next mechanism that is used is **concatenation,** see chapter 9.2.3.24.1. This mechanism permits longer messages than 140 bytes, in fact 255 messages a 140 bytes each can be concatenated to one message up to about 38k bytes.

EMS IEs of the same type may occur more than once in a single message or one segment of a concatenated SM.

9.2.3.24.10.1.1 Text Formatting

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 Start position of the text formatting. Set to the number of characters after the formatting shall be applied from the beginning of the SM data.

These~~is~~ octets shall be coded as an integer value in the range 0 (beginning of the SM data) to the maximum number of characters included in the SM data of one single SM or ~~one segment of~~ a concatenated SM

Octets ~~2~~3-4 Text formatting length. Gives the number of formatted characters

~~This~~These octets shall be coded as an integer value in the range 1 to the maximum number of characters for which the formatting applies in one single SM or ~~one segment of~~ a concatenated SM.

Octet ~~3~~5 formatting mode value coded as following :

Octet ~~3~~5 : Bit 7 Bit 6 Bit 5 Bit 4 Bit 3 Bit 2 Bit 1 Bit 0

Bit 1	Bit 0	*Alignment
0	0	Left (default)
0	1	Center
1	0	Right
1	1	*reserved*

*in case formatting text is inserted on the same line as previous non formatting text or with a different mode value, the alignment value shall be set to the same value as the previous formatted predefined object.

Bit 3	Bit 2	Font Size
0	0	Normal (default)
0	1	Large
1	0	Small
1	1	*reserved*

Bit 4	Style **bold**
1	Bold on
0	Bold off

Bit 5	Style *Italic*
1	Italic on
0	Italic off

Bit 6	Style Underlined
1	Underlined on
0	Underlined off

Bit 7	Style ~~Strikethrough~~
1	Strikethrough on
0	Strikethrough off

If bit 4,5,6 and 7 are set to 0, it will mean normal style (default).

9.2.3.24.10.1.2 Predefined Sound

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating in the SM data the instant after which the sound shall be played. It will be set to the number of characters from the beginning of the SM data after which the sound shall be played.

~~This~~ These octets shall be coded as an integer value in the range 0 (beginning of the SM data) to the maximum number of characters included in the SM data of one single SM or ~~one segment of~~ a concatenated SM

Octet ~~2~~3 sound number. Shall be encoded as a integer value.

9.2.3.24.10.1.3 User Defined Sound

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating in the SM data the instant the after which the sound shall be played (refer to section 9.2.3.24.10.1.2).

Octet(s) ~~2~~3-n Protocol Data Unit as described in section 9.2.3.24.10.3.1

This octet(s) shall contain a User Defined Sound.

9.2.3.24.10.1.4 Predefined Animation

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating in the SM data the instant the animation shall be displayed. Set to the number of characters from the beginning of the SM data after which the animation shall be displayed.

~~This~~These octets shall be coded as an integer value in the range 0 (beginning of the SM data) to the maximum number of characters included in the SM data of one single SM or ~~one segment of~~ a concatenated SM

Octet ~~2~~3 animation number. Shall be encoded as an integer value.

9.2.3.24.10.1.5 Large Animation

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating the instant the animation shall be displayed in the SM data (refer section 9.2.3.24.10.1.4).

Octet(s) ~~2~~3-n Protocol Data Unit as described in section 9.2.3.24.10.3.3

This octet(s) shall contain a Large Animation.

9.2.3.24.10.1.6 Small Animation

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating the instant the animation shall be displayed in the SM data (refer section 9.2.3.24.10.1.4).

Octet(s) ~~2~~3-n Protocol Data Unit as described in section 9.2.3.24.10.3.3

This octet(s) shall contain a Small Animation.

9.2.3.24.10.1.7 Large Picture

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating in the SM data the instant the picture shall be displayed. Set to the number of characters from the beginning of the SM data after which the picture shall be displayed.

~~This~~These octets shall be coded as an integer value in the range 0 (beginning of the SM data) to the maximum number of characters included in the SM data of one single SM or ~~one segment of~~ a concatenated SM

Octet(s) ~~2~~3-n Protocol Data Unit as described in 9.2.3.24.10.3.2

This octet(s) shall contain a Large Picture.

9.2.3.24.10.1.8 Small Picture

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating in the SM data the instant the picture shall be displayed in the SM data (refer section 9.2.3.24.10.1.7)

Octet(s) ~~2~~3-n Protocol Data Unit as described in section 9.2.3.24.10.3.2

This octet(s) shall contain a Small Picture.

9.2.3.24.10.1.9 Variable Picture

The Information-Element-Data octet(s) shall be coded as follows.

Octets 1-2 position indicating in the SM data the instant the picture shall be displayed in the SM data (refer section 9.2.3.24.10.1.7)

Octet ~~2~~3 Horizontal dimension of the picture.

This octet shall contain the horizontal number of 8 pixels i.e. this value shall be multiplied by 8 to get the whole number of horizontal pixels.

Octet ~~3~~4 Vertical dimension of the picture.

This octet shall contain the vertical number of pixels.

Octet(s) ~~4~~5-n Protocol Data Unit as described in section 9.2.3.24.10.3.2

This octet(s) shall contain a Variable Picture line by line from top left to bottom right.

The values of the horizontal and vertical dimensions must be chosen properly by the sending entity. If the calculated size of this IE exceeds the limits of a single SM or segment it shall be discarded by the receiving entity.

9.2.3.24.10.2 Examples of EMS coding

All IE values in the TP-UD are hexadecimal values.

9.2.3.24.10.2.1 Example of Basic text formatting and predefined EMS coding

An example of the basic concept of coding is given as follows:

TP-UDHI=1

SMS User Data Header: UDHL=0507, IEI=0A, IEDL=0305, IED_1=00, IED_{24}=0F, IED_3=00, IED_{42}=1213, IED_{53}=10

SMS User Data: This is a text with bold option on following with normal text.

Should be displayed as:

This is a text **with bold option on** following with normal text.

It is also possible to add predefined sounds in the message.

Example:

TP-UDHI=1

SMS User Data Header: UDHL=080A, IEI=0B, IEDL=0203, IED_1=00, IED_{42}=09,<sound5>, IEI=0B, IEDL=203, IED_1=00, IED_{42}=1C,
————————<sound7>

SMS User Data: This is a message with two different sounds

The sound nr5 shall be played after the 9th received character (“a”) and sound nr7 shall be played after the 28th received character (“ed”).

9.2.3.24.10.2.2 Example of User defined Objects EMS coding

Example of a message including one small picture is coded as follows:

TP UDHI=1

SMS User Data Header: UDHL=24, IEI=11, IEIDL=22, IED_1=00, IED_{42}=08, < ☎ (small picture 32bytes)>

SMS User Data: Hello!<CR><LF><CR><LF>One small picture in here

Should be displayed as :

Hello! ☎ One small picture in here

If the message starts with <CR>, then the “unreadable” data in an old terminal will be overwritten by the text, and the user will not see any strange characters. It is possible to insert the same picture several times in the same message. In that case, the TP-UD header shall contain as many IE as the number of occurrences contained in the SM or one segment of a concatenated message or a concatenated message. Using defined elements will normally imply that more than one SM is required and therefore concatenation is required.

9.2.3.24.10.2.3 Concatenation of SMS messages

Concatenated messages are required in most cases ~~required~~ when using several types of EMS elements, since it is only possible to send one large picture/large animation/melody in one single SM. After including either of these elements, there are only 4 (or 9 if no concatenation is used) characters left to the text part, and this is usually too little.

~~If one or more objects are embedded in one segment of a concatenated message, the IE octet indicating its/their position within the SM data cannot be set to a value that would refer to a position in the next segment(s) so that received segments should be processed before all of them have been received. It means that a formatting text that could not be conveyed in one segment shall be split in as many segments as necessary . In that case, the IE relating to the formatting shall be repeated in all the segments in which it will apply.~~

If an object is embedded in a user data header of a segment of a concatenated message, then IE octets indicating its position within the SM data of the whole concatenated message can only be set to a value that refers to a position in this or in the following segment(s). This means that a text formatting information or a picture or other embedded object cannot be placed to a segment of a concatenated message after the actual presentation place of the object.

If a text formatting IEI is embedded in a user data header of a segment of a concatenated message, then IE octets indicating the length of formatting within the SM data of the whole concatenated message can be set to a value that exceeds the length of SM data of the segment where the formatting begins unless it is not the last segment. This means that a text formatting IEI need not to be repeated if text formatting continues in the SM data of the next segment(s).

Example of a message including 2 Large Pictures, 4 Small animations and 2 User defined Melodies together with some text.

The EMS message: <Large Picture1> <User Defined Melody 1> Hello All, This is a real Enhanced Message <Small Animation 1>. I can send <Small Animation 2> and receive <Small Animation 3> really advanced EMS messages <Animation 4> Isn’t it impressive? /Lars <User Defined Melody2> <Large Picture 2>

This EMS message has to use concatenated messages and the SM will ty~~i~~pically contain the following data:

SM	User Data Header	User Data
1	IEI=10 (Large Picture), IEIDL=82, IED$_1$=00, IED$_2$=00 (beginning of the SM) <Large Picture 1 (128 bytes)>	[<CR><LF>]
2	IEI=0C (User Defined Sound), IEIDL=7C (max), IED$_1$=00, IED$_2$=02 (~~beginning of the SM~~2nd position) <User Melody 1 (~~129~~124bytes max)>	Hello<SP>
3	IEI=0F (Small Animation), IEIDL=22, IED$_1$=00, IED$_{2}$=~~2~~42C (~~36~~44th position) <Small Animation 1 (32 bytes)> IEI=0F (Small Animation), IEIDL=22, IED$_1$=00, IED$_{2}$=~~2F~~38 (~~47~~56th position) <Small Animation 2 (32 bytes)>	All, This is a real Enhanced Message. I can send and<SP>
4	IEI=0F (Small Animation), IEIDL=22, IED$_1$=00, IED$_{2}$=~~07~~44 (~~76~~8th position) <Small Animation 3 (32 bytes)> IEI=0F (Small Animation), IEIDL=22, IED$_1$=00, IED$_{2}$=~~25~~61 (~~37~~97th position) <Small Animation 4 (32 bytes)>	Receive really advanced EMS messages. Isn't it impressive? /Lars~~.~~
5	IEI=0C (User Defined Sound), IEIDL=82 (max), IED$_1$=00, IED$_{2}$=~~00~~7D (~~beginning of the SM~~125th position) <User Melody 1 (128 bytes max)>	[<CR><LF>]
6	IEI=10 (Large Picture), IEIDL=82, IED$_1$=00, IED$_{2}$=~~00~~7F (~~beginning of the SM~~127th position) <Large Picture 2 (128 bytes)>	

9.2.3.24.10.3 EMS Formats

9.2.3.24.10.3.1 Sounds

Predefined Sounds

There are a number of fixed predefined sounds. Each sound nr corresponds to a specific sound according to the table below. The presentations of these sounds are manufacturer specific.

Sound nr	Description
0	Chimes high
1	Chimes low
2	Ding
3	TaDa
4	Notify
5	Drum
6	Claps
7	FanFar
8	Chord high
9	Chord low

User defined sounds

The user defined sounds are coded according to the iMelody format[33]. The maximum length of a sound is 128 bytes.

9.2.3.24.10.3.2 Pictures

Pictures are coded from upper left to lower right and in each byte the most significant bit represent the pixel at the left. The pictures are plain black and white, no colours or grey scales are supported. The bitvalue “0” represents a white pixel and the bitvalue “1” represents a black pixel.

Example 16*16 picture

Byte 1	Byte 2
Byte 3	Byte 4
…	…
…	…
Byte 31	Byte 32

9.2.3.24.10.3.3 Animation

Predefined

There are a number of predefined animations. Each animation nr corresponds to a specific animation according to the table below. The way of displaying the animation is manufacturer specific.

Animation nr	Description
0	I am ironic, flirty
1	I am glad
2	I am sceptic

3	I am sad
4	WOW!
5	I am crying

User Defined

Animations are coded as 4 sequential pictures, with the first picture sent first.