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CR-Form-v5

CHANGE REQUEST

⌘ **23.040** **CR** **CRNum** ⌘ **rev** **1** ⌘ Current version: **5.2.0** ⌘

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

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

Title:	⌘	Polyphonic Extended Object
Source:	⌘	T2
Work item code:	⌘	MESS5-EMS
Date:	⌘	Feb. 15, 2002
Category:	⌘	**B**
Release:	⌘	REL-5

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	To define a polyphony media format for EMS
Summary of change:	⌘	The reference section has been updated to include MIDI references. The EMS specific section has been modified to add a new Extended Object data format for SP-MIDI, with details of the bits and specific restrictions in Annex E.13. Also, a new annex is added which includes guidelines for content providers. In Rev. 1, the notes, to cover the case if SP-MIDI was not publicly available, have been deleted (Annexes E.13 and G). SP-MIDI information is available via the MMA website http://www.midi.org.
Consequences if not approved:	⌘	An existing industry standard solution for polyphonic would not be available for EMS.

Clauses affected:	⌘	Section 2, Section 9.2.3.24.10.1.11, New Annex E.13, New Annex G
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

2 References

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

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

[1] 3GPP TS 01.04: "Abbreviations and acronyms".

[2] 3GPP TS 02.03: "Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

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

[4] 3GPP TS 22.041: "Operator Determined Barring (ODB)".

[5] 3GPP TS 23.002: "Network architecture".

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

[7] 3GPP TS 23.011: "Technical realization of supplementary services".

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

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

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

[11] 3GPP TS 43.047: "Example protocol stacks for interconnecting Service Centre(s) (SC) and Mobile-services Switching Centre(s) (MSC)".

[12] 3GPP TS 44.008: "Mobile radio interface layer 3 specification".

[13] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[14] 3GPP 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] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[16] 3GPP TS 51.011: "Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[17] CCITT Recommendation E.164 (Blue Book): "The international public telecommunication numbering plan".

[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 services: Message handling system and service overview".

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

[25] 3GPP TS 22.022: "Personalisation of Mobile Equipment (ME); Mobile functionality specification".

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

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

[28] 3GPP TS 43.048: "Security Mechanisms for the SIM application toolkit; Stage 2".

[29] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

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

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

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

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

[34] IETF RFC 822: "Standard for the format of ARPA Internet text messages".

[35] void

[36] "vCard - The Electronic Business Card", version 2.1,The Internet Mail Consortium (IMC), September 18, 1996, URL:http://www.imc.org/pdi/vcard-21.doc".

[37] "vCalendar - the Electronic Calendaring and Scheduling Format", version 1.0, The Internet Mail Consortium (IMC), September 18, 1996, URL:http://www.imc.org/pdi/vcal-10.doc

[38] Scalable Polyphony MIDI Specification, MIDI Manufacturers Association (2002); http://www.midi.org

[39] Scalable Polyphony MIDI Device 5-to-24 Note Profile for 3GPP, MIDI Manufacturers Association (2002); http://www.midi.org

[40] The Complete MIDI 1.0 Detailed Specification, Incorporating all Recommended Practices, MIDI Manufacturers Association, Document version 96.1, 1996; http://www.midi.org

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9.2.3.24.10.1.11 Extended Object

The Extended Object allows an extended code range for format types. The Extended Object may extend across segment boundaries of a concatenated short message. Octets 1 through 7 of the first Extended Object IE shall be contained in a single segment. A single segment may include one or more Extended Object IEs.

If multiple SMs are concatenated and at least one of them contains an Extended Object information element, then concatenation of the SMs shall be done using the 'Concatenated short messages, 16-bit reference number', verses the

'Concatenated short messages, 8-bit reference number' information element. The re-assembly of the Extended Object segments shall be done according to the sequence number of the associated Concatenation IE.

One or more Extended Objects may be compressed using a compression algorithm as indicated in the Compression Control IE (see clause 9.2.3.24.10.1.13).

An SME implementing the Extended Object IE shall be capable of interpreting an uncompressed concatenated message composed of at least **min_eo_msg** short messages which have been received. According to current content provider requirements and handset manufacturer constraints, variable **min_eo_msg** is set to 8.

The first Extended Object IE of an Extended Object contains a reference number, length, control data, type and position. The subsequent Extended Object IEs shall only contain Extended Object data as illustrated in Figure 9.2.24.10.11.

The IE length is variable.

Octet 1 Extended Object reference number.
A modulo 256 counter indicating the reference number for the Extended Object. Two different Extended Objects in a single concatenated message shall have different reference numbers.

Octet 2..3 Extended Object length in number of octets (integer representation) as shown in Figure 9.2.3.24.10.1.11.

Octet 4 Control data.

Bit 0 Object distribution

0 Object may be forwarded
1 Object shall not be forwarded by SMS

Bit 1 User Prompt Indicator

0 Object shall be handled normally
1 Object shall be handled as a User Prompt (see 9.2.3.24.10.1.10)

Bit 2..7 reserved

Any reserved values shall be set to 0.

Octet 5 Extended Object Type.
This octet indicates the format of the Extended Object from the table below.
If the value is reserved or if the associated format is not supported then the receiving entity shall ignore the Extend Object.

Format Type	Format Description
0x00	Predefined sound as defined in annex E.
0x01	iMelody as defined in annex E.
0x02	Black and white bitmap as defined in annex E.
0x03	2-bit greyscale bitmap as defined in annex E.
0x04	6-bit colour bitmap as defined in annex E.
0x05	Predefined animation as defined in annex E.
0x06	Black and white bitmap animation as defined in annex E.
0x07	2-bit greyscale bitmap animation as defined in annex E.
0x08	6-bit colour bitmap animation as defined in annex E.
0x09	vCard as defined in annex E.
0x0A	vCalendar as defined in annex E.
0x0B	Polyphonic melody as defined in annex E.
0x0C~~B~~.. 0xFE	Reserved
0xFF	Data Format Delivery Request as defined in annex E.

Octet 6..7 Extended Object Position (integer representation).
The Extended Object Position indicates the absolute character position within the message text after which the object shall be played or displayed. The absolute character position relates to the entire text within the concatenated message, the first character is numbered character 1.

NOTE: Although this is an absolute value, for concatenated messages, it is suggested the positions used are those that lie within the text of short message segments that have the sequence number equal to or higher than the one that contains the Extended Object IE.

If more than one Extended Object is located at the same position then they may be played or displayed in sequence or simultaneously.

Octet 8..n Extended Object Data.
This sequence of octets is structured as illustrated in the figure below and defined annex E. This figure illustrates the construction of a number of SMs containing a large Extended Object which crosses a SM boundary and is encoded into 2 SM TPDUs. The figure illustrates only the User Data field of the SM (TPDUs). For a description of concatenation of SM refer to Figures 9.2.3.24 (a, b and c)

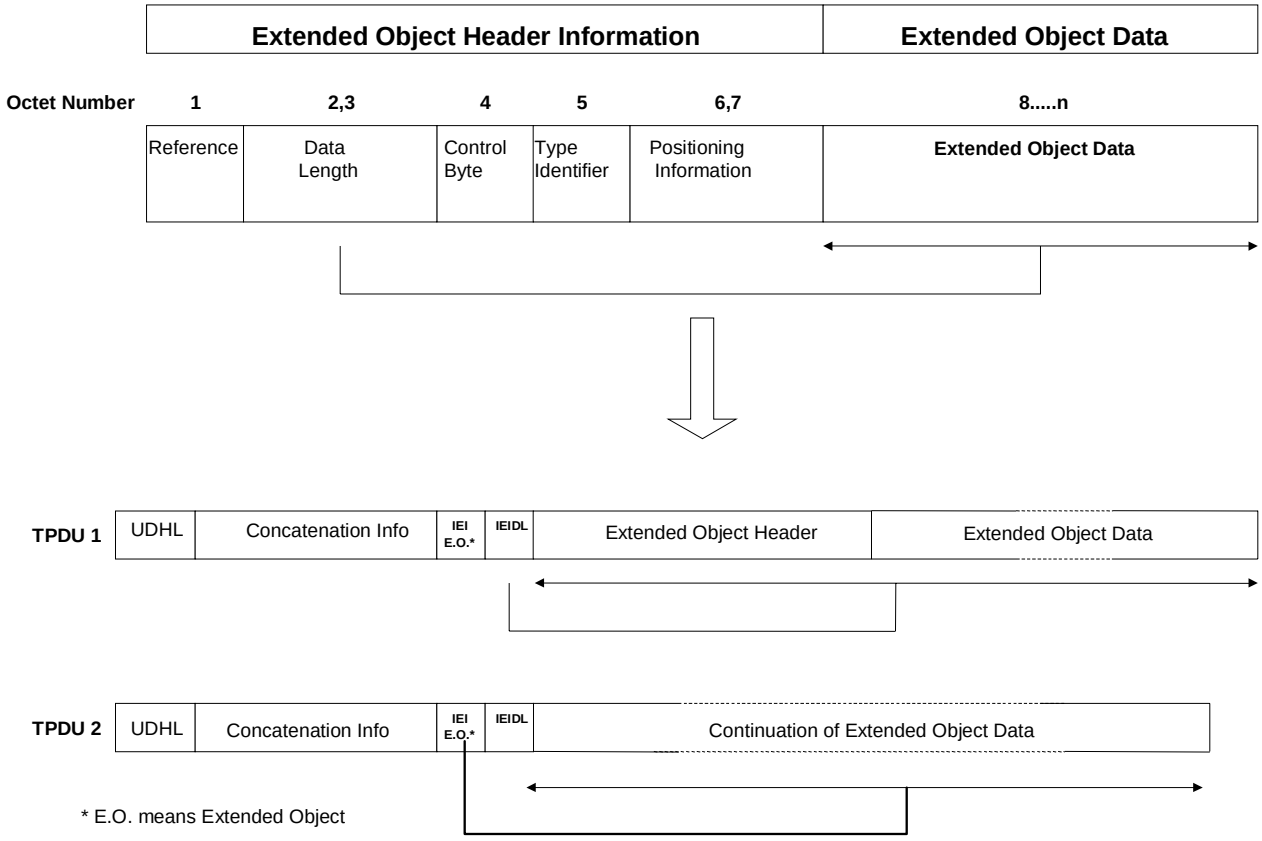

Figure 9.2.3.24.10.1.11

E.12 Data Format Delivery Request

This Data Format Delivery Request is an optional feature used by an SME to indicate which Extended Object data formats, listed in clause 9.2.3.24.10.1.11, it is requesting for delivery. This Data Format Delivery Request may be included by an SME in a MO SM containing other EMS related data, or in a MO SM independently. Processing of this data format is optional in a MT short message.

The information in this data format represents an extensible bit field with the first bit being mapped to the first Extended Object (EO) data format defined in the table in clause 9.2.3.24.10.1.11.

Octet 8

Bit 0: If set to 1 indicates support for EO data format 00

Bit 1: If set to 1 indicates support for EO data format 01

Bit 2: If set to 1 indicates support for EO data format 02

……

……

Octet n

Bit 0: If set indicates support for EO data format ((n – 8) * 8)

Bit 1: If set indicates support for EO data format ((n – 8) * 8) + 1

Bit 2: If set indicates support for EO data format ((n – 8) * 8) + 2

…….

Any unused bits in the last octet shall be set to zero.

E.13 Polyphonic melody

A Polyphonic melody can be integrated as an extended object in one or more short messages. Informative guidelines for the creation of polyphony content using SP-MIDI [38] are listed in Annex G.

However, in order to guarantee the interoperability with legacy mobile devices which are not able to interpret specific SP-MIDI content, the following considerations shall be taken into account for content creation:

- When content is not provided in SP-MIDI format the presence of the MIP table in polyphonic extended objects is not mandatory. Since a receiving SME supporting polyphonic extended objects may decide to ignore and skip the content of a MIP message by implementing its own note stealing or channel masking strategy when played. However, when SP-MIDI format data is present and the message is stored and subject to potential forwarding, the specific SP-MIDI content shall be kept as received by the SME.
- the additional rhythm channel as specified in section 3.2 in [38] might not be supported by the receiving SME.

~~**Note**: SP-MIDI is not available yet as a published specification by MMA/AMEI. In case this specification could not be available before the date the present release is frozen, SMF type 0 or 1 is proposed as the polyphonic format to be used for the creation of polyphonic content in EMS in accordance with [40].~~

Octet 8..n SMF as defined in [38], [40]

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Annex G (informative): Development Guidelines for Creation of Polyhony Using SP-MIDI

While Scalable Polyphony-MIDI (SP-MIDI) [38] is a full-featured standard for synthesizing music, using a few guidelines SP-MIDI [38, 39] can be optimized for wireless devices. These guidelines can be grouped as optimizing individual notes, and to minimize the overall size of a melody.

~~**Note**: SP-MIDI profile for 3GPP [39] is not available yet as a published specification by MMA/AMEI and reference to 3GPP not validated by 3GPP MCC in accordance with its liaison rules. In case this specification could not be available~~

~~before the date the present release is frozen, the guidelines to be used by content providers are those following that are independant of the specifiation mentioned in this present note.~~

1. Running status

In the Musical Instrument Digital Interface (MIDI) standard, a key-on or a key-off event will use at most three bytes each, cf. [40], However, in case several key events occur on the same MIDI-channel, running status can be used. In principle running status means that the first byte of, e.g. key-on is omitted. In addition, the key-on event having a velocity of zero is equivalent to the key-off event. Thus, combining running status and using key-on with zero velocity, as the key-off event will reduce the number of bytes needed to encode key events.

EXAMPLE:

Without running status the sequence

91 2E 23 8E, 91 2B 50 8E, 81 2E 64 00, 81 2B 64 00

means "Key 2E ON" Velocity 23 MIDI Ch 1", "Key 2B ON Velocity 50 MIDI Ch 1", "Key 2E OFF Velocity 64 MIDI Ch 1", "Key 2B OFF Velocity 64 MIDI Ch 1". Using running status will reduce the sequence into

91 2E 23 8E, 2B 50 8E, 2E 00 00, 2B 00 00,

That is, the command byte is omitted and velocity zero is used for key off.

2. File type considerations

The SP-MIDI content can be stored in, a Standard MIDI File (SMF) of type 0 or type 1 [40]. In a type 0 SMF, one header chunk and one track chunk is used. In a type 1 SMF one header chunk and several track chunks are used. SMF type 2 should not be used

3. File size reduction

In general it is more efficient to store the MIDI data as a type 1 file. The increased efficiency is reached if each track contains one MIDI channel and one instrument (This is often the case). Evidently, running status can be applied on each individual track reducing the track size. To further reduce the size of the file use one track per used MIDI channel. That is, if a temple/conductor track exists merge it with the first instrument track. Remove, all meta events which are not necessary, e.g. "track name", "lyric". To summarize, the following measures can be taken in order to reduce the SMF:

1. Use SMF type 1 (Or check if type 1 is smaller than type 0 and use the smallest)
2. Use running status
3. One and only one instrument per track. Try not to change channels.
4. Do not change tempo in the middle of the music, i.e., only set tempo once.
5. Use beat, instead of SMPTE, to set tempo
6. Copyright is on automatically
7. Remove controller messages, which are optional according to [39].
8. Turn off the options below:
    - Sequence Number - MIDI sequence ids
    - Text - embedded text for anything
    - Sequence / Track Name
    - Instrument Name
    - Lyric
    - Marker - for synchronization purposes
    - Cue Point
    - Midi Channel Presix - associate channels with all events following
    - Sequencer-Specific settings

Items 1 to 3 above optimize the notes, while items 4 to 8 optimize the overall melody. The above measures will provide an SMF, which is ready for compression. However, prior to compression the composer/content author can consider to use few values for key velocity and thereby increasing the redundancy of the file.

4. Restrictions

Content creators should not expect the full support for the following features:

- MIDI message channel pressure
- MIDI message pitch bend
- Individual stereophonic panoramic (pan) as expressed in table 5 in [39].
- MIDI message master volume

Content creators should not expect a time granularity better than 5ms to be supported by the SME.

To ensure interoperability, the first value of the MIP table should be no more than 6 voices.