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Media formats and codecs
(3GPP TS 26.141 version 16.0.0 Release 16)**



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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

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Introduction

The 3GPP Technical Specifications TS 22.340 [55] and TS 22.141 [56] define the requirements for the 3GPP IP Multimedia Subsystem (IMS) based messaging and presence services. This Technical Specification takes the requirements into account when defining the minimal baseline and optional media codecs and message container format to be used by IMS Messaging and associated Presence service, when supported.

IMS Messaging services incorporate one or more of the following messaging types Immediate messaging, Deferred delivery messaging, and Session based messaging. With Immediate messaging the sender expects immediate message delivery in what is perceived as real time compared with Deferred messaging where the sender expects the network to deliver the message as soon as the recipient becomes available. With Session based messaging a communications association is established between two or more users before communication can take place. In the simplest form Session based messaging may be a direct communication between two users. This specification defines the media types and container formats for both the Immediate message type and the Session based message type.

The specification provides the ability to have an interoperable baseline set of media types for messaging and presence services, that will simultaneously maximise the technology re-use of the already existing 3GPP services with media types, defined in TS 26.140 [13] and TS 26.234 [14]. Simultaneously, the specification will provide the ability to indicate the IMS system about the complete set of UE media and storage capabilities relevant for the IMS messaging and presence service.

For IMS terminals capable of Combined CS and IMS (CSI) operation [59][60], the specification provides an Annex with guidelines on how to combine IMS media with CS calls.

1 Scope

The present document specifies the basic media formats and codecs to be used in the IMS Messaging and Presence services, including CSI. It defines the mandatory 'baseline' set of media types for the services. Additionally, it also targets to allow possible message content type enhancements, either 3GPP-standardized or other generally used media types, in a flexible way.

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.
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3 Definitions, symbols and abbreviations

3.1 Definitions

Deferred delivery messaging: A type of IMS Messaging service by which the sender expects the network to deliver the message as soon as the recipient becomes available.

Immediate messaging: A type of IMS Messaging service by which the sender expects immediate message delivery in (near) real time fashion.

IMS Messaging services: A group of services, supported by capabilities of the 3GPP IP Multimedia Subsystem 3GPP TS 22.228 [54], that allows an IMS user to send and receive messages to other users. IMS messaging services comprise of one or more types: Immediate messaging, Session based messaging and Deferred delivery messaging.

Session based messaging: A type of IMS Messaging service by which the sender expects immediate message delivery in (near) real time fashion. In addition the sender(s) and the receiver(s) have to join to a messaging session e.g. chat room, before message exchange can take place.

continuous media: media with an inherent notion of time, in the present document speech, audio, synthetic audio and video.

static media: media that itself does not contain an element of time, in the present document all media not defined as continuous media.

scene description: description of the spatial layout and temporal behaviour of a presentation, it can also contain hyperlinks.

3.2 Abbreviations

| | |
|------------------|---|
| 3GP | 3GPP file format |
| AAC | Advanced Audio Coding |
| AMR | Adaptive Multi-rate Codec |
| CC/PP | Composite Capability/Preference Profiles |
| CSI | Combination of CS and IMS services |
| DLS | Downloadable Sounds |
| Enhanced aacPlus | MPEG-4 High Efficiency AAC plus MPEG-4 Parametric Stereo |
| EXIF | Exchangeable image file format |
| GIF | Graphics Interchange Format |
| IP | Internet Protocol |
| IMS | IP Multimedia Subsystem |
| ITU-T | International Telecommunications Union - Telecommunications |
| JFIF | JPEG File Interchange Format |
| JPEG | Joint Picture Expert Group |
| MIDI | Musical Instrument Digital Interface |
| MIME | Multipurpose Internet Mail Extensions |
| MM | Multimedia Message |
| MMS | Multimedia Messaging Service |
| MPEG | Motion Picture Expert Group |
| MP4 | MPEG-4 file format |
| MTSI | Multimedia Telephony Service for IMS |
| PSS | Packet-switched Streaming Service |
| SBR | Spectral Band Replication |
| SP-MIDI | Scalable Polyphony MIDI |
| SVG | Scalable Vector Graphics |
| UTF-8 | Unicode Transformation Format (the 8-bit form) |
| XMF | Extensible Music Format |

4 Formats for Static Media

Multiple media elements shall be combined into a composite single IMS message using MIME multipart content type format as defined in RFC 2046 [25]. The media type of a single IMS message element shall be identified by its appropriate MIME type whereas the media format shall be indicated by its appropriate MIME subtype.

In order to guarantee a minimum support and compatibility between IMS Messaging and Presence Service capable terminals and OMA IMPS 1.1 capable terminals, IMS Messaging User Agent and IMS Presence User Agent supporting specific media types shall comply with the following selection of media formats:

4.1 Text

Plain text. Any character encoding (charset) that contains a subset of the logical characters in Unicode [2] shall be used (e.g. US-ASCII [3], ISO-8859-1 [4], UTF-8 [5], Shift_JIS, etc.).

Unrecognized subtypes of "text" shall be treated as subtype "plain" as long as the MIME implementation knows how to handle the charset. Any other unrecognized subtype and unrecognized charset shall be treated as "application/octet - stream".

4.2 Still Image

For IMS terminals supporting still images, ISO/IEC JPEG [8] together with JFIF [9] shall be supported. The support for ISO/IEC JPEG only apply to the following two modes:

- mandatory: baseline DCT, non-differential, Huffman coding, as defined in table B.1, symbol 'SOF0' in [8];
- optional: progressive DCT, non-differential, Huffman coding, as defined in table B.1, symbol 'SOF2' [8].

For JPEG baseline DCT, EXIF compressed image file format should also be supported, as defined in [58]. In that case there is no requirement for the MMS Messaging and Presence client to interpret or present the EXIF parameters recorded in the file.

4.3 Bitmap Graphics

For IMS terminals, supporting bitmap graphics, the following bitmap graphics formats should be supported:

- GIF87a [15];
- GIF89a [16];
- PNG [17].

5 Formats for Continuous Media

In order to guarantee a minimum support and compatibility between IMS Messaging and Presence Service capable terminals and MMS capable terminals that offer support of continuous media formats (section 5) and media synchronisation and scene description (see section 6), IMS Messaging User Agent and IMS Presence User Agent supporting specific media types should in addition to formats listed in section 4 of this document comply with the following selection of media formats:

5.1 Speech

For IMS terminals supporting speech, the AMR codec shall be supported for narrow-band speech [26][40][41][42].

The AMR wideband speech codec [27] [43][44][45] shall be supported when wideband speech working at 16 kHz sampling frequency is supported.

When using speech media type alone, AMR or AMR-WB data stored according to the file format specified in [32] should be supported. The mandatory format is defined in clause 5.4.

Multi-channel sessions shall not be used.

5.2 Audio

For IMS terminals supporting audio, one or both of the following two audio codecs should be supported:

- Enhanced aacPlus [49][50][51]
- Extended AMR-WB [46][47][45]

There is no requirement that a terminal supporting decoding by one of the codecs shall also support encoding by that codec.

Specifically, based on the audio codec selection test results Extended AMR-WB is strong for the scenarios marked with blue, Enhanced aacPlus is strong for the scenarios marked with orange, and both are strong for the scenarios marked with green colour in the table below:

| Content type | Music | Speech over Music | Speech between Music | Speech |
|----------------|-------|-------------------|----------------------|--------|
| Bit rate | | | | |
| 14 kbps mono | | | | |
| 18 kbps stereo | | | | |
| 24 kbps stereo | | | | |
| 24 kbps mono | | | | |
| 32 kbps stereo | | | | |
| 48 kbps stereo | | | | |

More recent information on the performance of the codecs based on more recent versions of the codecs can be found in TR 26.936 [62].

Enhanced aacPlus decoder is also able to decode MPEG-4 AAC LC content.

Extended AMR-WB decoder is also able to decode AMR-WB content.

In addition, MPEG-4 AAC Low Complexity and MPEG-4 AAC Long Term Prediction object types [19] may be supported. The maximum sampling rate to be supported by the decoder is 48 kHz. The channel configurations to be supported are mono (1/0) and stereo (2/0).

5.3 Video

For IMS terminals supporting video, media codecs are specified in TS 26.114 [63], clause 5.2.2. The video codecs are the same as for MTSI clients in terminals.

5.4 File Format for video and associated speech/audio media types

To ensure interoperability for the transport of video and associated speech/audio in an IMS Messaging and Presence client, the 3GPP file format with Basic profile shall be supported.

The usage of the 3GPP file format shall follow the technical specifications and the implementation guidelines specified in TS 26.244 [33].

5.5 Synthetic audio

For IMS terminals supporting synthetic audio, the Scalable Polyphony MIDI (SP-MIDI) content format defined in Scalable Polyphony MIDI Specification [28] and the device requirements defined in Scalable Polyphony MIDI Device 5-to-24 Note Profile for 3GPP [29] should be supported.

SP-MIDI content is delivered in the structure specified in Standard MIDI Files 1.0 [31], either in format 0 or format 1.

In addition the Mobile DLS instrument format defined in [38] and the Mobile XMF content format defined in [39] should be supported.

A MSS client supporting Mobile DLS shall meet the minimum device requirements defined in [38] in section 1.3 and the requirements for the common part of the synthesizer voice as defined in [38] in sections 1.2.1.2. If Mobile DLS is supported, wavetables encoded with the G.711 A-law codec (wFormatTag value 0x0006, as defined in [38]) shall also be supported. The optional group of processing blocks as defined in [38] may be supported. Mobile DLS resources are delivered either in the file format defined in [38], or within Mobile XMF as defined in [39]. For Mobile DLS files delivered outside of Mobile XMF, the loading application should unload Mobile DLS instruments so that the sound bank required by the SP-MIDI profile [29] is not persistently altered by temporary loadings of Mobile DLS files.

Content that pairs Mobile DLS and SP-MIDI resources is delivered in the structure specified in Mobile XMF [39]. As defined in [39], a Mobile XMF file shall contain one SP-MIDI SMF file and no more than one Mobile DLS file. MMS clients supporting Mobile XMF must not support any other resource types in the Mobile XMF file. Media handling behaviours for the SP-MIDI SMF and Mobile DLS resources contained within Mobile XMF are defined in [39].

5.6 Vector graphics

For IMS terminals supporting 2D vector graphics, the Scalable Vector Graphics (SVG) Tiny 1.2 format [20][21] and ECMAScript [54] shall be supported.

NOTE 1: The compression format for SVG content is GZIP [35], in accordance with the SVG specification [20].

NOTE 2: Only media formats supported by IMS Messaging and Presence, as specified in clauses 4 and 5 of this specification, shall be used. MMS Messaging and Presence clients do not support the Ogg Vorbis format.

NOTE 3: Content creators of SVG Tiny 1.2 for IMS Messaging and Presence clients are strongly recommended to follow the content creation guidelines provided for PSS clients in Annex L of [14].

NOTE 4: If SVG Tiny 1.2 will not be published within a reasonable timeframe, the decision to adopt SVG Tiny 1.2 in favour of SVG Tiny 1.1 may be reconsidered.

6 Media synchronisation and presentation format

The 3GPP IMS Messaging and Presence uses a subset of SMIL 2.0 [24] for media synchronisation and scene description. IMS clients and servers with support for media synchronization and scene descriptions shall support the 3GPP SMIL Language Profile defined in [34].

- This profile is a subset of the SMIL 2.0 Language Profile but a superset of the SMIL 2.0 Basic Language Profile. Document [34] also includes an informative annex A that provides guidelines for SMIL content authors.

Additionally, XHTML Mobile Profile [30] for scene description should be supported. IMS clients and servers with support for scene descriptions based on XHTML shall support XHTML Mobile Profile [30], defined by the WAP Forum.

- XHTML Mobile Profile is a subset of XHTML 1.1 but a superset of XHTML Basic.

Annex A (informative): CSI Handling

A.1 Introduction

The Combination of CS and IMS services (CSI) is an operation mode combining circuit switch calls and IMS services, where the UE presents the CS and IMS services within one context to the user [59][60]. However, the capability to simultaneously render certain media types of a CS call and IMS session may be limited by a UE and capability exchange alone may not be enough to resolve such conflicts. For instance:

- During a CS speech call, a UE may not be able to render additional speech accompanying a video clip in an IMS session. This limitation is not clear if the UE has indicated that it is capable of receiving video clips.
- During a CS multimedia call, a UE may not be able to both display video from the CS call and images from the IMS session. Although the UE is not capable to fully render images and video simultaneously, it may be possible to view images in front of video.

The above conflicts are resolved by applying default rules specified in [59]. This Annex describes the UE behaviour for a number of scenarios drawn from the rules in [59]. This list may be extended in future versions of this specification.

Note that the IMS media types and formats applicable to CSI are specified in:

- clauses 6 and 9 of reference [61] for streamed media;
- clauses 4 and 5 of the present document for media delivered in messages.

A.2 Sharing personal content during CS voice call

In a person-2-person communication, participants can combine a CS voice call with an IMS session and share content such as still images and video. In particular participants may share media content that is (or has been) created by the participants in the session.

TS 22.279 [59] defines that if media, or parts thereof, accepted by a user cannot be rendered by the UE simultaneously with the CS call, conflicts shall be resolved such that the user is presented with CS speech with preference over IMS speech/audio.

A.3 Sharing personal content during CS multimedia call

In a person-2-person communication, participants can combine a CS multimedia call (3G-324M) with an IMS session and share content such as still images. In particular participants may share media content that is (or has been) created by the participants in the session.

TS 22.279 [59] defines that if media, or parts thereof, accepted by a user cannot be rendered by the UE simultaneously with the CS call, conflicts shall be resolved such that the user is presented with:

- CS speech with preference over IMS speech/audio;
- IMS video and images with preference over CS video.

Annex B (informative): Change history

| Change history | | | | | | | | |
|----------------|-----------|--------|------|-----|-----|---|--------|--------|
| TSG SA# | SA Doc. | Spec | CR | Rev | Cat | Subject/Comment | Old | New |
| 26 | SP-040835 | 26.141 | | | | Version 1.0.0 approved at TSG SA#26 | 1.0.0 | 6.0.0 |
| 27 | SP-050098 | 26.141 | 001 | 1 | F | Editorial correction on missing IMS Presence UA | 6.0.0 | 6.1.0 |
| 30 | SP-050789 | 26.141 | 0003 | 2 | F | Adding missing reference numbers | 6.1.0 | 6.2.0 |
| 30 | SP-050790 | 26.141 | 0002 | 5 | B | CSI interoperability of media types and formats | 6.2.0 | 7.0.0 |
| 31 | SP-060009 | 26.141 | 0005 | 1 | A | Addition of a reference to TR 26.936 | 7.0.0 | 7.1.0 |
| 42 | | 26.141 | | | | Version for Release 8 | 7.1.0 | 8.0.0 |
| 46 | | 26.141 | | | | Version for Release 9 | 8.0.0 | 9.0.0 |
| 51 | | 26.141 | | | | Version for Release 10 | 9.0.0 | 10.0.0 |
| 57 | | 26.141 | | | | Version for Release 11 | 10.0.0 | 11.0.0 |
| 62 | SP-130578 | 26.141 | 0006 | | D | Clarification of H.264 profile support requirement | 11.0.0 | 12.0.0 |
| 63 | SP-140015 | 26.141 | 0007 | 1 | C | Video Coding Enhancements in IMS Messaging and Presence | 12.0.0 | 12.1.0 |
| 70 | | 26.141 | | | | Version for Release 13 | 12.1.0 | 13.0.0 |

| Change history | | | | | | | |
|----------------|---------|------|----|-----|-----|--------------------------------|---------------|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2017-03 | 75 | | | | | Version for Release 14 | 14.0.0 |
| 2018-06 | 80 | | | | | Version for Release 15 | 15.0.0 |
| 2020-07 | - | - | - | - | - | Update to Rel-16 version (MCC) | 16.0.0 |

History

| Document history | | |
|-------------------------|-------------|-------------|
| V16.0.0 | August 2020 | Publication |
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