**3GPP TSG- Meeting #**

**, , - merge S4aI250134 & revision of S4aI250115**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | [MeME-MED] Media Messaging Enhancements | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change 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](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Additional stage-3 work has been recommended in clause 6.3.2 of TR 26.841:  4. For *Key Topic #6: Media Service Enabler* as introduced in clause 5.6 and based on the conclusions in clause 5.6.4:  In addition, it was observed that still image profile based on HEVC lacks features that are commonly used and supported.  In addition, when checking the exising capability support in the TS in context of RCS messaging, some key gaps are noted:   1. RCS messages    1. HEIC with 10 bit and HDR capability    2. Use 'mp42' as the major brand, in addition to 3gpx major barnds. This is consistent with MIME types given in 26.143, e.g. “audio/mp4”.    3. Do not necessarily use 3gp9 major brand, rather often use earlier brands.    4. Main 10 profile decoders decode Main profile content. 2. A few smaller issues identified in TS 26.143 are:    1. There is a typo where image capability PNG is misdirected to capability GIF. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | For *Key Topic #6: Media Service Enabler* as introduced in clause 5.6 and based on the conclusions in clause 5.6.4 of TR 26.841:  a. Connect TS 26.143 to 3GPP TR 26.857 that it fulfils some MSE concepts  b. Add a call flow to TS 26.143 aligned with what is in clause 4.1 of TR 26.841  c. Add a set of stage-2 APIs and parameter that can be assigned to player and generator  d. Add more examples for valid content  In addition, this CR addresses alignment with RCS message requirements   1. HEIC with 10 bit and HDR capability supported 2. Allow use 'mp42' as the major brand, in addition to 3gpx major barnds. This is consistent with MIME types given in 26.143, e.g. “audio/mp4” and not necessarily use 3gp9 major brand, rather often use earlier brands. 3. Main 10 profile decoders can decode Main profile content. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Work item objectives not fulfilled.  Capabilities not meeting RCS messaging capabilities | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3, 4.2, 4.6 (new), 5.1, 5.2.1, 5.4.1, 5.4.2, 5.6.1, 5.6.2, 6.2.1, 6.2.2, 6.3.1, 6.3.2, 6.3.3, Annex B.2 (new), Annex B.3 (new), Annex D (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | This CR is a revision of S4aI250115 and merges S4aI250134. | | | | | | | | |

## ===== CHANGE =====

# 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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] Khronos glTF 2.0, [glTF™ 2.0 Specification (khronos.org)](https://registry.khronos.org/glTF/specs/2.0/glTF-2.0.html)

[3] ISO/IEC 23090-14 AMD 2, Information technology — Coded representation of immersive media — Part 14: Scene description — Amendment 2: Support for haptics, augmented reality, avatars, Interactivity, MPEG-I audio, and lighting

[4] 3GPP TS 26.511: "5G Media Streaming (5GMS); Profiles, Codecs and Formats".

[5] 3GPP TS 26.117: "5G Media Streaming (5GMS); Speech and audio profiles".

[6] IETF Draft draft-ietf-mimi-content-01: "More Instant Messaging Interoperability (MIMI) message content", Rohan Mahy

[7] 3GPP TS 22.140: "Multimedia Messaging Service (MMS); Stage 1".

[8] Open Mobile alliance, "MMS Architecture" OMA-AD-MMS-V1\_3-20110913-A.

[9] Open Mobile alliance, "Multimedia Messaging Service Encapsulation Protocol" OMA-TS-MMS\_ENC-V1\_3-20110913-A.

[10] GSMA "RCS Universal Profile Service Definition Document", Version 2.6, 19 December 2022.

[11] GSMA PRD RCC.07 version 13.0 - "Rich Communication Suite - Advanced Communications Services and Client Specification" 19 December 2022.

[12] IETF RFC 2046, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types".

[13] ISO/IEC 14496-12: "Information technology - Coding of audio-visual objects -Part 12: ISO base media file format".

[14] ISO/IEC 23000-24:2023 Preliminary Draft of: Information technology — Multimedia application format (MPEG-A) — Part 24: Messaging Media Application Format (MeMAF) ".

NOTE: A preliminary draft of this standard is available as MDS23345\_W03\_N1082 here: https://www.mpeg.org/wp-content/uploads/mpeg\_meetings/144\_Hannover/w23345.zip

[15] 3GPP 23.140: "Multimedia Messaging Service (MMS); Functional Description; Stage 2".

[16] ITU-T Recommendation T.81: "Information technology; Digital compression and coding of continuous-tone still images: Requirements and guidelines".

[17] "JPEG File Interchange Format", Version 1.02, September 1, 1992.

[18] "Exchangeable image file format for digital still cameras: EXIF 2.2", Specification by the Japan Electronics and Information Technology Industries Association (JEITA), April 2002, URL: <http://www.exif.org/>

[19] CompuServe Incorporated: "GIF Graphics Interchange Format: A Standard defining a mechanism for the storage and transmission of raster-based graphics information", Columbus, OH, USA, 1987.

[20] Compuserve Incorporated, Columbus, Ohio (1990): "Graphics Interchange Format (Version 89a)".

[21] IETF RFC 2083: "PNG (Portable Networks Graphics) Specification version 1.0 ", T. Boutell, et. al., March 1997.

[22] ISO/IEC 23000-22:2019 Information technology — Multimedia application format (MPEG-A) — Part 22: Multi-image application format (MIAF)

[23] IETF RFC 2045, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", November 1996

[24] ISO/IEC 23008-12:2019 Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 12: Image File Format

[25] ITU-T Recommendation H.265 (02/2018): "High efficiency video coding".

[26] 3GPP TS 26.244: "Transparent end-to-end packet switched streaming service (PSS); 3GPP file format (3GP)"

[27] 3GPP TS 26.245: "Transparent end-to-end packet switched streaming service (PSS); Timed text format"

[28] ISO/IEC 14496-30: "Information technology - Coding of audio-visual objects - Part 30: Timed text and other visual overlays in ISO base media file format".

[29] IETF RFC 2387, "The MIME Multipart/Related Content-type"

[30] IETF RFC 6381, "The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types"

[31] 3GPP TS 26.307, "Presentation Layer for 3GPP Services"

[32] 3GPP TS 26.140, "Multimedia Messaging Service (MMS); Media formats and codecs"

[33] IETF RFC 2077, "The Model Primary Content Type for Multipurpose Internet Mail Extensions"

[34] 3GPP TS 26.119, "Media Capabilities for Augmented Reality"

[35] 3GPP TR 26.857, "5G Media Service Enablers"

[36] ISO/IEC 14496-14: "Information technology - Coding of audio-visual objects -Part 14: MP4 file format".

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## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AAC Advanced Audio Coding

AMR Adaptive MultiRate

API Application Programming Interface

AVC Advanced Video Coding

DCT Discrete Cosine Transform

glTF Graphics Library Transmission Format

IANA Internet Assigned Numbers Authority

HDR High Dynamic Range

MIME Multipurpose Internet Mail Extensions

MIMI More Instant Messaging Interoperability

MMBP multimedia messaging body part

MMS Multimedia Messaging Service

OMA Open Mobile Alliance

PDU Protocol Data Unit

RCS Rich Communication Services

SDR Standard Dynamic Range

## ===== CHANGE =====

## 4.2 System Description

Based on the background and assumptions in clause 4.1, Figure 4.2-1 provides an example system for a messaging services and highlights scope of this specification, namely the definition of a *multimedia messaging body part* (MMBP) and the associated metadata.



Figure 4.2-1 Example system for Messaging multimedia message exchange

A Messaging Service Sender instructs a MMBP generator to generate an MMBP, for example using an API. This for example allows to define configurations on codecs, size, experiences or other attributes of the MMBP. The details of such an API are outside the scope of this specification. The sender adds the MMBP to a Container Message (either included as a body part or by reference), together with MMBP metadata parameters that provide information about the MMBP. Metadata includes, but is not limited to:

- The media type of the MMBP, including subtypes and parameters for codecs, etc.

- The size of the MMBP

- Accessibility or language information about the MMBP

- processing requirements of recommendations of the MMBP

The client of the messaging service receives the container message that includes the above information. The client communicates with a MMBP player its capabilities whether the MMBP can be played back, and if multiple alternatives are present, which of those are to be selected. Then the messaging service client instructs the MMBP player to playback the MMBP as part of the messaging service, based on the processing requirements and instructions. Playback may be combined with additional instructions for a player, including play, pause, seek, etc.

In TR 26.857 [35], Media Service Enablers are introduced. The basic concept of the Media Service Enabler is to support third-party delivery of media over the 5G System. The Application Provider is equipped with a set of 3GPP-specified functions, possibly both on UE and network side, in order to simplify operations. These functions are bundled as a Media Service Enabler (MSE) and offered to the Application Provider.

The MMBP Generator and MMBP Player are aligned with the Media Service Enabler concept. In order to support MSE concepts, the specification includes:

- A call flow and high-level procedures in clause 4.6.

- Stage-2 APIs and parameter that can be assigned to player and generator in Annex D.

- Several examples for content offerings in Annex B.

## ===== CHANGE =====

## 4.6 Typical Procedures for Messaging Services

Figure 4.6 provides a generic call flow based on the architecture shown in Figure 4.2-1 and the player model shown in Figure 4.3-1.

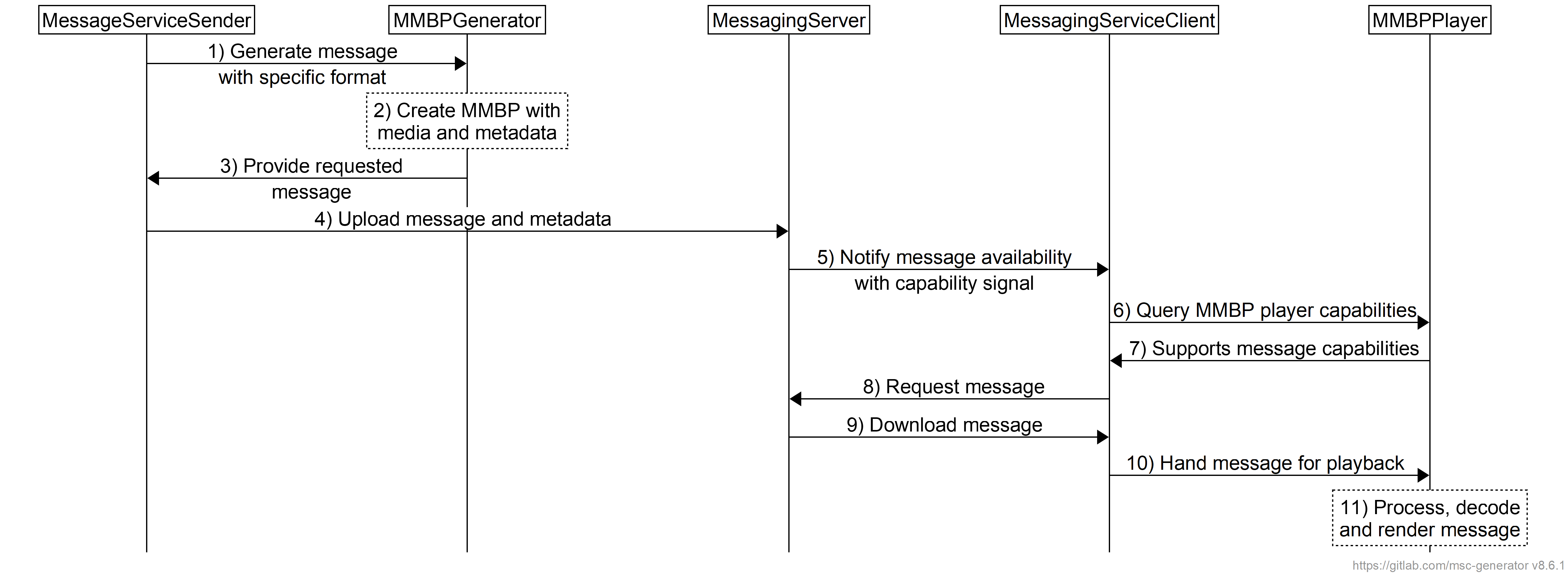


Figure 4.6-1 High-Level Call flow for messaging

The following high-level call flow is executed to address messaging:

1) A Message Service Sender instructs and MMBP generator to generate a message with the requested formats where the format is defined through a set of parameters handed over on an MMBP-GEN-API.

2) The MMBP generator creates an MMBP with relevant media data and adds relevant static and dynamic metadata.

3) The generated message is provided to the Message Service Sender.

4) The generated file with associated relevant static and dynamic metadata is provided in a container message that is uploaded to a messaging server, together with a signalling in the media type and associated parameters. The media signalling may include that the file is suitable for different clients.

5) A messaging service client is informed about the availability of a message in this format using the media type signalling together with appropriate sub-parameters.

6) A messaging service client uses the MMBP-PLAY-API to query the MMBP player with it can process, decode and render the message.

7-10) If the MMBP player indicates that it supports the capability, the messaging service client selects and downloads the message and hands it to the MMBP player for playback.

11) The MMBP player processes, decodes and renders the message based on its decoding and rendering capabilities.

## ===== CHANGE =====

## 5.1 Introduction

In order to guarantee a minimum support and compatibility between messaging capable terminals, MMBP Generators and MMBP Players in UEs supporting specific media content with associated media types.

The clause defines multimedia messaging body parts (MMBPs) for different media types as well as the associated media types.

According to the introduction in clause 4, MMBPs defined in this clause,

- may be used as full body parts or sub-parts in message bodies.

- may either be a single binary octet string, or they may consist of multiple parts. If the latter, the conceptual relationship introduced in clause 4.4 is defined that is mapped to container formats defined in clause 5.2.

Media Types and related capabilities defined in this specification for playback are provided in Table 5.1-1.

Table 5.1-1 Media Types and Capabilities defined in TS 26.143 for playback and decoding

|  |  |  |  |
| --- | --- | --- | --- |
| **Media Type in the present TS** | Capabilities defined in this specification | Clause | Media Type signalling example |
| **Multipart MMBPs and Container Formats** | 26143\_CONTAINER\_RFC2046\_SINGLE  26143\_CONTAINER\_RFC2046\_MIXED  26143\_CONTAINER\_RFC2046\_ALTERNATIVE  26143\_CONTAINER\_RFC2046\_PARALLEL  26143\_CONTAINER\_RFC2387\_RELATED  26143\_CONTAINER\_MP4\_3GP9  26143\_CONTAINER\_MP4\_MP42 | 5.2.1 | Media type of subtype  multipart/mixed  multipart/alternative  multipart/parallel  multipart/related  video/mp4, profile="3gp9"  video/mp4, profile="mp42" |
| **Text** | 26143\_TEXT\_PLAIN | 5.3.1 | text/plain |
| **Speech** | 26143\_AUDIO\_IVAS  26143\_AUDIO\_EVS  26143\_AUDIO\_AMR-WB  26143\_AUDIO\_AMR | 5.5.1 | audio/mp4 |
| **Audio** | 26143\_AUDIO\_IVAS  26143\_AUDIO\_XHE-AAC  26143\_AUDIO\_EAAC+ | 5.5.1 | audio/mp4 |
| **Image** | 26143\_IMG\_JPEG  26143\_IMG\_HEIC  26143\_IMG\_GIF  26143\_IMG\_PNG | 5.4.1 | image/jpeg  image/heic, profile="heic,MiHB" imageTypes="hvc1.1.2.L153.B0"  image/gif  image/png |
| **Video** | 26143\_VIDEO\_AVC-HD  26143\_VIDEO\_AVC-FullHD  26143\_VIDEO\_HEVC-HD  26143\_VIDEO\_HEVC-FullHD  26143\_VIDEO\_HEVC-UHD | 5.6.1 | video/mp4, profile="3gp9" codecs="avc1.640028"  video/mp4, profile="3gp9" codecs="avc1.640029"  video/mp4, profile="3gp9" codecs="hvc1.1.2.L93.B0"  video/mp4, profile="3gp9" codecs="hvc1.1.2.L123.B0"  video/mp4, profile="3gp9" codecs="hvc1.1.2.L153.B0" |
| **Subtitles and Text** | 26143\_TT\_3GPP  26143\_TT\_IMSC11 | 5.7.1 | text/mp4, profile="3gp9" codecs="tx3g"  application/mp4, profile="3gp9" codecs="stpp.ttml.im2t" |
| **3d scenes and assets** | 26143\_SCENE\_GLTF20  26143\_SCENE\_GLTF20\_AR  26143\_SCENE\_GLTF20\_GLB  26143\_SCENE\_GLTF20\_GLB\_AR | 5.8 | model/gltf+json  model/gltf-binary |
| **Presentation format** | 26143\_PRESENTATION\_HTML5 | 5.9 | text/html |

Media Types and related capabilities defined in this specification for content generation are provided in Table 5.1-2.

Table 5.1-2 Media Types and Capabilities defined in TS 26.143 for generation

|  |  |  |  |
| --- | --- | --- | --- |
| Media Type in the present TS | Capabilities defined in this specification | Clause | Media Type signalling example |
| **Multipart MMBPs and Container Formats** | 26143\_CONTAINER\_RFC2046\_SINGLE\_GEN  26143\_CONTAINER\_RFC2046\_MIXED\_GEN  26143\_CONTAINER\_RFC2046\_ALTERNATIVE\_GEN  26143\_CONTAINER\_RFC2046\_PARALLEL\_GEN  26143\_CONTAINER\_MP4\_3GP9\_GEN  26143\_CONTAINER\_MP4\_MP42\_GEN | 5.2.2 | Media type of subtype  multipart/mixed  multipart/alternative  multipart/parallel  video/mp4, profile="3gp9"  video/mp4, profile="mp42" |
| **Text** | 26143\_TEXT\_ENC\_PLAIN | 5.3.1 | text/plain |
| **Speech** | 26143\_AUDIO\_ENC\_IVAS  26143\_AUDIO\_ENC\_EVS  26143\_AUDIO\_ENC\_AMR-WB  26143\_AUDIO\_ENC\_AMR | 5.5.1 | audio/mp4 |
| **Audio** | 26143\_AUDIO\_ENC\_IVAS  26143\_AUDIO\_ENC\_XHE-AAC  26143\_AUDIO\_ENC\_EAAC+ | 5.5.1 | audio/mp4 |
| **Image** | 26143\_IMG\_ENC\_JPEG  26143\_IMG\_ENC\_HEIC | 5.4.1 | image/jpeg  image/heic, profile="heic,MiHB" itemTypes="hvc1.2.4.L153.B0" |
| **Video** | 26143\_VIDEO\_ENC\_AVC-HD  26143\_VIDEO\_ENC\_AVC-FullHD  26143\_VIDEO\_ENC\_HEVC-HD  26143\_VIDEO\_ENC\_HEVC-FullHD  26143\_VIDEO\_ENC\_HEVC-UHD | 5.6.2 | video/mp4, profile="3gp9" codecs="avc1.640028"  video/mp4, profile="3gp9" codecs="avc1.640029"  video/mp4, profile="3gp9" codecs="hvc1.1.2.L93.B0"  video/mp4, profile="3gp9" codecs="hvc1.1.2.L123.B0"  video/mp4, profile="3gp9" codecs="hvc1.1.2.L153.B0" |
| **Text** | 26143\_TT\_ENC\_3GPP | 5.7.2 | text/mp4, profile="3gp9" codecs="tx3g" |

## ===== CHANGE =====

5.2.1 Player and Decoding capabilities

The capability 26143\_CONTAINER\_RFC2046\_SINGLE is defined as the capability of processing a body part of with a top-level media type as defined in IETF RFC 2046 [12] with one of the following top-level media types: text, audio, image, video, model, multipart, and application.

The capability 26143\_CONTAINER\_RFC2046\_MIXED is defined as the capability of processing a body part of subtype multipart/mixed as defined in IETF RFC 2046 [12] further restricted by the processing defined in clause 4.4 for *mixed MMBPs*. In the context of this specification, the media type for multipart media types with this capability 26143\_CONTAINER\_RFC2046\_MIXED shall be signalled with multipart/mixed as defined in IETF RFC 2046 [12].

The capability 26143\_CONTAINER\_RFC2046\_ALTERNATIVE is defined as the capability of processing a body part of subtype multipart/alternative as defined in IETF RFC 2046 [12] further restricted by the processing defined in clause 4.4 for *alternative MMBPs*. In the context of this specification, the media type for multipart media types with this capability 26143\_CONTAINER\_RFC2046\_MIXED shall be signalled with multipart/alternative as defined in IETF RFC 2046 [12].

The capability 26143\_CONTAINER\_RFC2046\_PARALLEL is defined as the capability of processing a body part of subtype multipart/parallel as defined in IETF RFC 2046 [12] further restricted by the processing defined in clause 4.4 for *parallel MMBPs*. In the context of this specification, the media type for multipart media types with this capability 26143\_CONTAINER\_RFC2046\_PARALLEL shall be signalled with multipart/parallel as defined in IETF RFC 2046 [12].

The capability 26143\_CONTAINER\_RFC2387\_RELATED is defined as the capability of processing a body part of subtype multipart/related as defined in IETF RFC 2387 [29] further restricted by the processing defined in clause 4.4 for *related MMBPs*. In the context of this specification, the media type for multipart media types with this capability 26143\_CONTAINER\_RFC2387\_RELATED shall be signalled with multipart/parallel as defined in IETF RFC 2387 [29] with the *root MMBP* either signalled with the start parameter, or if not present, the *root MMBP* being the first body part within the Multipart/Related body and the type of the *root MMBP* signalled with the type parameter.

The capability 26143\_CONTAINER\_MP4\_3GP9 is defined as the capability of processing a body part conforming to a 3GP file Rel-9 basic profile as defined in TS 26.244 [26] identified by the brand '3gp9' and further restricted by the processing defined in clause 4.4 for *parallel MMBPs*. In the context of this specification, the media type for multipart media types with this capability 26143\_CONTAINER\_MP4\_3GP9 shall be signalled using a media type as defined IETF RFC 6381 [30] using for example video/mp4, profile="3gp9" or an equivalently compatible media type and shall use the codecs parameter to further provide information about the contained MMBPs.

The capability 26143\_CONTAINER\_MP4 is defined as the capability of processing a body part conforming to a file identified by the brand 'mp42' as defined in ISO/IEC 14496-14 [36] and further restricted by the processing defined in clause 4.4 for *parallel MMBPs*. In the context of this specification, the media type for multipart media types with this capability 26143\_CONTAINER\_MP4 shall be signalled using a media type as defined IETF RFC 6381 [30] using for example video/mp4 or an equivalently compatible media type and shall use the codecs parameter to further provide information about the contained MMBPs.

NOTE: This specification does not define mechanisms for referencing external content. This aspect is for further study.

## ===== CHANGE =====

### 5.4.1 Player and Decoding capabilities

The capability 26143\_IMG\_JPEG is defined as the capability of decoding and rendering images according to, ISO/IEC JPEG [8] together

- with JFIF [16] and the following two modes:

- baseline DCT, non-differential, Huffman coding, as defined in table B.1, symbol ‘SOF0’ in [17];

- progressive DCT, non-differential, Huffman coding, as defined in table B.1, symbol ‘SOF2’ [17].- with EXIF compressed image file format, as defined in [18] and the baseline DCT mode.

In the context of this specification, the media type for images with this capability 26143\_IMG\_JPEG shall be signalled with image/jpeg as defined in IETF RFC 2046 [12].

The capability 26143\_IMG\_HEIC is defined as the capability of decoding and rendering an MMBP that includes images and the MMBP conforming to

- the 'heic' brand as defined in ISO/IEC 23008-12 [24],

- the 'MiHB' brand as defined in ISO/IEC 23000-22:2019 [22], and

- the contained elementary bitstream conforming to H.265 (HEVC) Main 10 Profile, Main Tier, Level 5.1[25] bitstreams with the following constraints

- general\_progressive\_source\_flag equal to 1, general interlaced\_source\_flag equal to 0, general\_non\_packed\_constraint\_flag equal to 1, and general\_frame\_only\_constraint\_flag equal to 1.- the chroma sub-sampling is set to be 4:2:0 and the value of chroma\_format\_idc is set to 1.

- the included signal being either a Standard Dynamic Range (SDR) signal with

- the bit depth being 8 bit or 10 bit,

- In the VUI, the values of colour\_primaries, transfer\_characteristics and matrix\_coeffs each are set to 1,

- The value of chroma\_sample\_loc\_type\_top\_field is be set to 0,

- or, the included signal being a High Dynamic Range (HDR) signal with

- the bit depth being 10 bit,

- in the VUI, the values of colour\_primaries and matrix\_coeffs each set to 9, and the value of transfer\_characteristics is set to one of the following values: 14 (for SDR with WCG), 16 (for PQ) and 18 (for HLG).

- The value of the chroma\_sample\_loc\_type\_top\_field set to 2.

In the context of this specification, the media type for images with this capability 26143\_IMG\_HEIC shall be signalled with image/heic, profile="heic,MiHB" itemTypes="hvc1.2.4.L153.B0" or an equivalently compatible media type as defined in [22]. The capability 26143\_IMG\_GIF is defined as the capability of decoding and rendering bitmap graphics conforming either to GIF87a [19] or to GIF89a, [20]. In the context of this specification, the media type for images with this capability 26143\_IMG\_GIF shall be signalled with image/gif as defined in IETF RFC 2046 [12].

The capability 26143\_IMG\_PNG is defined as the capability of decoding and rendering bitmap graphics conforming to PNG [21]. In the context of this specification, the media type for images with this capability 26143\_IMG\_PNG shall be signalled with image/png.

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### 5.4.2 MMBP Content Generator capabilities

The capability 26143\_IMG\_ENC\_JPEG for a content generator is defined as the combination of the following capabilities:

- the capability to generate an image according to ISO/IEC JPEG [8] that can be played by a player conforming to 26143\_IMG\_JPEG as defined in clause 5.4.1, i.e. restricted by either

- using JFIF [16] and one of the following two modes:

- baseline DCT, non-differential, Huffman coding, as defined in table B.1, symbol ‘SOF0’ in [17], or

- progressive DCT, non-differential, Huffman coding, as defined in table B.1, symbol ‘SOF2’ [17].

- using EXIF compressed image file format as defined in [18] and the baseline DCT mode.

- the provisioning of media type signalling with the MMBP using image/jpeg as defined in IETF RFC 2046 [12].

The capability 26143\_IMG\_ENC\_HEIC for a content generator is defined as the combination of the following capabilities:

- the capability to generate an image according to ISO/IEC 23008-12 [24] that can be played by a player conforming to 26143\_IMG\_HEIC as defined in clause 5.4.1, i.e. restricted by either

- the provisioning of media type signalling with the MMBP using image/heic, profile="heic,MiHB" itemTypes="hvc1.2.4.L153.B0" or an equivalently compatible media type as defined in [22].

## ===== CHANGE =====

5.6.1 Player and Decoding capabilities

The capability 26143\_VIDEO\_AVC-HD is defined as the capability of playing back (decoding and rendering) a file that

- is decodable by a decoder capable of the **AVC-HD-Dec** decoding capabilities as defined in clause 4.2.1.1 of TS 26.511 [4],

- is encapsulated in an ISO BMFF Track [14] conforming with the requirements of the sample entry 'avc1' as defined in ISO/IEC 14496-15 [15],

- is contained in a 3GP file that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

In the context of this specification, the media type for files with this capability 26143\_VIDEO\_AVC-HD shall be signalled with video/mp4, profile="3gp9" codecs="avc1.640028" or video/mp4, codecs="avc1.640028", or an equivalently compatible media type.

The capability 26143\_VIDEO\_AVC-FullHD is defined as the capability of playing back (decoding and rendering) a file that

- is decodable by a decoder capable of the **AVC-FullHD-Dec** decoding capabilities as defined in clause 4.2.1.1 of TS 26.511 [4],

- is encapsulated in an ISO BMFF Track [14] conforming with the requirements of the sample entry 'avc1' as defined in ISO/IEC 14496-15 [15],

- is contained in a 3GP file that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

In the context of this specification, the media type for files with this capability 26143\_VIDEO\_AVC-FullHD shall be signalled with video/mp4, profile="3gp9" codecs="avc1.640029" or video/mp4, codecs="avc1.640029", or an equivalently compatible media type.

The capability 26143\_VIDEO\_HEVC-HD is defined as the capability of playing back (decoding and rendering) a file that

- is decodable by a decoder capable of the **HEVC-HD-Dec** decoding capabilities as defined in clause 4.2.2.1 of TS 26.511 [4],

- is encapsulated in an ISO BMFF Track [14] conforming with the requirements of the sample entry 'hvc1' as defined in ISO/IEC 14496-15 [15],

- is contained in a 3GP file that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

In the context of this specification, the media type for files with this capability 26143\_VIDEO\_HEVC-HD shall be signalled with video/mp4, profile="3gp9" codecs="hvc1.1.2.L93.B0" or video/mp4, codecs="hvc1.1.2.L93.B0", or an equivalently compatible media type.

The capability 26143\_VIDEO\_HEVC-FullHD is defined as the capability of playing back (decoding and rendering) a file that

- is decodable by a decoder capable of the **HEVC-FullHD-Dec** decoding capabilities as defined in clause 4.2.2.1 of TS 26.511 [4],

NOTE: HEVC decoders with this decoding capability can also decode bitstreams with a Main Profile.

- is encapsulated in an ISO BMFF Track [14] conforming with the requirements of the sample entry 'hvc1' as defined in ISO/IEC 14496-15 [15],

- is contained in a 3GP file that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

In the context of this specification, the media type for files with this capability 26143\_VIDEO\_HEVC-FullHD shall be signalled with video/mp4, profile="3gp9" codecs="hvc1.2.4.L123.B0" or video/mp4, codecs=" hvc1.2.4.L123.B0", or an equivalently compatible media type.

The capability 26143\_VIDEO\_HEVC-UHD is defined as the capability of playing back (decoding and rendering) a file that

- is decodable by a decoder capable of the **HEVC-UHD-Dec** decoding capabilities as defined in clause 4.2.2.1 of TS 26.511 [4],

NOTE: HEVC decoders with this decoding capability can also decode bitstreams with a Main Profile.

- is encapsulated in an ISO BMFF Track [14] conforming with the requirements of the sample entry 'hvc1' as defined in ISO/IEC 14496-15 [15],

- is contained in a 3GP file that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

In the context of this specification, the media type for files with this capability 26143\_VIDEO\_HEVC-UHD shall be signalled with video/mp4, profile="3gp9" codecs="hvc1.2.4.L153.B0" or video/mp4, codecs=" hvc1.2.4.L153.B0", or an equivalently compatible media type.

NOTE: In the absence of knowledge of detailed capabilities, 16:9 and 9:16 image formats are preferably used.

## ===== CHANGE =====

5.6.2 MMBP Content Generator capabilities

The capability 26143\_VIDEO\_ENC\_AVC-HD for a content generator is defined as the combination of the following capabilities:

- the capability to generate a file from a video signal in real-time, such that the file can be played back by a player with the capability 26143\_VIDEO\_AVC-HD,

- the **AVC-HD-Enc** encoding capabilities as defined in clause 4.1.2.2 of TS 26.511 [4] to generate a bitstream from the video signal

- the capability to generate an ISO BMFF track from the bitstream that conforms with the requirements of the sample entry 'avc1' as defined in ISO/IEC 14496-15 [15].

- the generation of a 3GP file from the ISO BMFF track that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

- the provisioning of media type signalling with the generated file using video/mp4, profile="3gp9" codecs="avc1.640028" or video/mp4, codecs="avc1.640028", or an equivalently compatible media type.

The capability 26143\_VIDEO\_ENC\_AVC-FullHD for a content generator is defined as the combination of the following capabilities:

- the capability to generate a file from a video signal in real-time, such that the file can be played back by a player with the capability 26143\_VIDEO\_AVC-FullHD,

- the **AVC-FullHD-Enc** encoding capabilities as defined in clause 4.1.2.2 of TS 26.511 [4] to generate a bitstream from the video signal

- the capability to generate an ISO BMFF track from the bitstream that conforms with the requirements of the sample entry 'avc1' as defined in ISO/IEC 14496-15 [15].

- the generation of a 3GP file from the ISO BMFF track that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

- the provisioning of media type signalling with the generated file using video/mp4, profile="3gp9" codecs="avc1.640029" or video/mp4, codecs="avc1.640029", or an equivalently compatible media type.

The capability 26143\_VIDEO\_ENC\_HEVC-HD for a content generator is defined as the combination of the following capabilities:

- the capability to generate a file from a video signal in real-time, such that the file can be played back by a player with the capability 26143\_VIDEO\_HEVC-HD,

- the **HEVC-HD-Enc** encoding capabilities as defined in clause 4.2.2.2 of TS 26.511 [4] to generate a bitstream from the video signal

- the capability to generate an ISO BMFF track from the bitstream that conforms with the requirements of the sample entry 'hvc1' as defined in ISO/IEC 14496-15 [15].

- the generation of a 3GP file from the ISO BMFF track that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

- the provisioning of media type signalling with the generated file using video/mp4, profile="3gp9" codecs="hvc1.1.2.L93.B0" or video/mp4, codecs=" hvc1.1.2.L93.B0", or an equivalently compatible media type.

The capability 26143\_VIDEO\_ENC\_HEVC-FullHD for a content generator is defined as the combination of the following capabilities:

- the capability to generate a file from a video signal in real-time, such that the file can be played back by a player with the capability 26143\_VIDEO\_HEVC-FullHD,

- the **HEVC-FullHD-Enc** encoding capabilities as defined in clause 4.2.2.2 of TS 26.511 [4] to generate a bitstream from the video signal

- the capability to generate an ISO BMFF track from the bitstream that conforms with the requirements of the sample entry 'hvc1' as defined in ISO/IEC 14496-15 [15].

- the generation of a 3GP file from the ISO BMFF track that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

- the provisioning of media type signalling with the generated file using video/mp4, profile="3gp9" codecs="hvc1.2.4.L123.B0" or video/mp4, codecs="hvc1.2.4.L123.B0", or an equivalently compatible media type.

The capability 26143\_VIDEO\_ENC\_HEVC-UHD for a content generator is defined as the combination of the following capabilities:

- the capability to generate a file from a video signal in real-time, such that the file can be played back by a player with the capability 26143\_VIDEO\_HEVC-UHD,

- the **HEVC-UHD-Enc** encoding capabilities as defined in clause 4.2.2.2 of TS 26.511 [4] to generate a bitstream from the video signal

- the capability to generate an ISO BMFF track from the bitstream that conforms with the requirements of the sample entry 'hvc1' as defined in ISO/IEC 14496-15 [15].

- the generation of a 3GP file from the ISO BMFF track that conforms to the 26143\_CONTAINER\_MP4\_3GP9 or 26143\_CONTAINER\_MP4 capability as defined in clause 5.2.

- the provisioning of media type signalling with the generated file using video/mp4, profile="3gp9" codecs="hvc1.2.4.L153.B0" or video/mp4, codecs="hvc1.2.4.L153.B0", or an equivalently compatible media type.

## ===== CHANGE =====

### 6.2.1 Overview

The baseline MMBP Player profile is aligned with TS 26.140 [32].

The container format is based on IETF RFC 2045 [23] as the format for the MMBPs. Offering of alternative content is the container is permitted. In addition, the profile permits to encapsulate encapsulation of real-time video into the 3GP file format using the baseline profile. The container does not support external bodies, i.e. the MMBP is expected to be delivered as a single message. For details on the container format requirements, refer to clause 6.2.2.

The media types address basic text, audio/speech, images, video, text/subtitle, 3D scenes including AR as well as simple HTML-5 presentations.

Content conforming to the baseline MMBP player may include media types that are not explicitly supported by the media capabilities as defined in clause 6.2.3. Receivers shall ignore non-recognized media types. However, based on the container requirements, ignoring media types may results in specific processing requirements, for example pick an alternative, or ignore the entire MMBP.

Content generated to be compatible for playback on players for this profile as well as players expose their capabilities should use the URN identifier "urn:3GPP:26143:19:baseline-mmbp-player".

## ===== CHANGE =====

### 6.2.2 Container Format

The following capabilities for the container format as defined in clause 5.2.1 shall be supported:

- 26143\_CONTAINER\_RFC2046\_SINGLE

- 26143\_CONTAINER\_RFC2046\_MIXED

- 26143\_CONTAINER\_RFC2046\_ALTERNATIVE

- 26143\_CONTAINER\_RFC2387\_RELATED

- 26143\_CONTAINER\_MP4\_3GP9

- 26143\_CONTAINER\_MP4\_MP42

The following capabilities for the container format as defined in clause 5.2 should be supported:

- 26143\_CONTAINER\_RFC2046\_PARALLEL

In addition, multipart/parallel shall not be present in an MMBP on the same level if a 3GP file Rel-9 basic profile as defined in TS 26.244 [26] identified by the brand '3gp9'is present and contains more than on track.

## ===== CHANGE =====

### 6.3.1 Overview

The baseline MMBP Generator profile is aligned with TS 26.140 [32].

It primarily addresses the ability for users to generate content, for example on a mobile device.

The container format is based on IETF RFC 2045 [23] as the format for the MMBPs. Offering of alternative content is the container is permitted. In addition, the profile permits to encapsulate encapsulation of real-time video into the 3GP file format using the baseline profile. The container does not support external bodies, i.e. the MMBP is expected to be delivered as a single message. For details on the container format requirements, refer to clause 6.3.2.

The media types supported by this profile are basic text, audio/speech, images, video, and text.

Content conforming to the baseline MMBP generator profile may include media types that are not explicitly supported by the media capabilities as defined in clause 6.3.3. Receivers are expected to ignore non-recognized media types. However, based on the container requirements, ignoring media types may results in specific processing requirements, for example pick an alternative, or ignore the entire MMBP.

Additional packaging requirements and recommendations are provided in clause 6.3.4.

Content generated to be compatible for this profile as well as generators expose their capabilities should use the URN identifier "urn:3GPP:26143:19:baseline-mmbp-generator".

## ===== CHANGE =====

### 6.3.2 Container Format

The following capabilities for the container format as defined in clause 5.2.2 shall be supported:

- 26143\_CONTAINER\_RFC2046\_SINGLE\_GEN

- 26143\_CONTAINER\_RFC2046\_MIXED\_GEN

- at least one of the the following two:

- 26143\_CONTAINER\_MP4\_3GP9\_GEN

- 26143\_CONTAINER\_MP4\_MP42\_GEN

The following capabilities for the container format as defined in clause 5.2 should be supported:

- 26143\_CONTAINER\_RFC2046\_PARALLEL\_GEN

- 26143\_CONTAINER\_RFC2046\_ALTERNATIVE\_GEN

## ===== CHANGE =====

### 6.3.3 Media Types

If the transmission of images is supported, then the following applies:

- the 26143\_IMAGE\_ENC\_JPEG capability as defined in clause 5.4.2 shall be supported.

- the 26143\_IMAGE\_ENC\_HEIC capability as defined in clause 5.4.2 should be supported.

If the transmission of speech is supported, then the following applies:

- the 26143\_AUDIO\_ENC\_IVAS capability as defined in clause 5.5.2 should be supported.

- the 26143\_AUDIO\_ENC\_EVS capability as defined in clause 5.5.2 shall be supported.

- the 26143\_AUDIO\_ENC\_AMR-WB capability as defined in clause 5.5.2 should be supported.

- the 26143\_AUDIO\_ENC\_AMR capability as defined in clause 5.5.2 may be supported.

If the transmission of audio is supported, then the following applies:

- the 26143\_AUDIO\_ENC\_IVAS capability as defined in clause 5.5.2 should be supported.

- the 26143\_AUDIO\_ENC\_EAAC+ capability as defined in clause 5.5.2 shall be supported.

- the 26143\_AUDIO\_ENC\_XHE-AAC capability as defined in clause 5.5.2 should be supported.

If the transmission of video is supported, then the following applies:

- the 26143\_VIDEO\_ENC\_HEVC-FullHD capability as defined in clause 5.6.2 shall be supported.

If the transmission of timed text is supported, then the following applies:

- the 26143\_TT\_ENC\_3GPP capability as defined in clause 5.7.2 shall be supported.

## ===== CHANGE =====

Annex B (informative):  
Examples

# B.1 MMBP message with a 3D asset

In this example we show an excerpt of a message that contains a 3D asset. The root entry is a glTF 2.0 file. The message has two additional parts: a binary file that contains the geometry of the 3D asset and an image that provides the texture of the 3D asset.

|  |
| --- |
| MIME-Version: 1.0  Content-Type: multipart/related; boundary="==============="  ===============  Content-Type: model/gltf+json  Content-Disposition: attachment; filename="sofa.gltf"  {  "asset": {  "version": "2.0"  },  "buffers": [  {  "uri": "buffer.bin",  "byteLength": 1024  }  ],  "images": [  {  "uri": "texture.jpg"  }  ],  "scenes": [  {  "nodes": [0]  }  ],  "nodes": [  {  "mesh": 0  }  ],  "meshes": [  {  "primitives": [  {  "attributes": {  "POSITION": 0  },  "indices": 1  }  ]  }  ],  "accessors": [  {  "bufferView": 0,  "componentType": 5126,  "count": 24,  "type": "VEC3"  }  ],  "bufferViews": [  {  "buffer": 0,  "byteOffset": 0,  "byteLength": 288  }  ]  }  ===============  Content-Type: application/octet-stream  Content-Disposition: attachment; filename="buffer.bin"  … binary data …  ===============  Content-Type: image/jpeg  Content-Disposition: attachment; filename="texture.jpg"  … binary data …  =============== |

# B.2 Single Media Type

## B.2.1 Introduction

This clause provides examples for MMBP message with a single media type according to 26143\_CONTAINER\_RFC2046\_SINGLE.

## B.2.2 Audio

The following example provides an MMBP that includes a single media in an 3gp file encoded with EVS.

|  |
| --- |
| MIME-Version: 1.0  Content-Type: audio/mp4, profiles="3gp9" codecs="sevs"; name="evs.3gp"  Content-Transfer-Encoding: base64  Content-Disposition: attachment; filename="evs.3gp"  AAAAHGZ0eXBNNA... (base64-encoded 3GP EVS audio-only data truncated) |

## B.2.3 Images

The following example provides an MMBP that includes a single png image containing the 3GPP logo.

|  |
| --- |
| MIME-Version: 1.0  Content-Type: image/png; name="3gpp.png"  Content-Transfer-Encoding: base64  Content-Disposition: attachment; filename="3gpp.png"  url(data:image/png;base64,) |

# B.3 3GP File with multiple media types

## B.3.1 Introduction

This clause provides examples for MMBP message with conforming to 26143\_CONTAINER\_MP4\_3GP9.

## B.3.2 Audio and Video in single file

The following example provides an MMBP that includes an EVS audio track and an HEVC video track in a single media in an 3gp file.

|  |
| --- |
| MIME-Version: 1.0  Content-Type: video/mp4, profiles="3gp9" codecs="hvc1.1.2.L93.B0,sevs"; name="av.3gp"  Content-Transfer-Encoding: base64  Content-Disposition: attachment; filename="av.3gp"  AAAAHGZ0eXBNNA... (base64-encoded 3GP AV file data truncated) |

## B.3.3 Audio and Video in Container

The following example provides an MMBP that includes an EVS audio file and an HEVC video file in a single container.

|  |
| --- |
| MIME-Version: 1.0  Content-Type: multipart/mixed; boundary="boundary42"  --boundary42  Content-Type: message/external-body; access-type=URL;  Content-Type: video/mp4, profiles="3gp9" codecs="hvc1.1.2.L93.B0"; name="video.3gp"  Content-Transfer-Encoding: base64  AAAAHGZ0eXBNNA... (base64-encoded 3GP video file data truncated)  --boundary42  Content-Type: message/external-body; access-type=URL;  Content-Type: audio/mp4, profiles="3gp9" codecs="sevs"; name="video.3gp"  Content-Transfer-Encoding: base64  BNAXGZeX... (base64-encoded 3GP audio file data truncated) |

## ===== CHANGE =====

Annex D (normative):  
API Definitions

# D.1 Introduction

This Annex collects the stage-2 API definition supported with Interface Definition Language (IDL) description MMBP-GEN-API and MMBP-PLAY-API. Note that this does not form a full implementation but can be used as a reference for implementations in different environments.

# D.2 MMBP-GEN-API

### D.2.1 Introduction

The MMBP-GEN-API is typically used by a Message Service Sender to generate an MMBP according to this specification.

### D.2.2 Filter Concept

#### D.2.2.1 General

The general methods defined in this clause allows packaging media resources into a conforming MMBP with focus on the baseline MMBP Generator Profile as defined in clause 6.3.

The encoding API is described by filters as for example defined here: https://wiki.gpac.io/Filters/filters\_general.

Encoding architectures can be built by using filters. Filters are configurable processing units consuming and producing data packets. These packets are carried between filters through a data channel called *PID*. A PID is in charge of allocating/tracking data packets and passing the packets to the destination filter(s). Each output PID carries a set of properties describing the data it delivers (e.g. *width*, *height*, *codec*, ...).

Each filter exposes a set of argument to configure itself, using property types and values described as strings formatted with separators.

Each filter is declared by its name, with optional filter arguments appended as a list of colon-separated name=value pairs. For encoding, typical parameters are:

- c=NAME: identifies the desired encoding codec capability as defined in clause 5.

- b=UINT: indicates the bitrate in bits per second

Filters can then be linked, for example using the following principle:

generate [options] FILTER [LINK] FILTER [...]

For typical generation processes in the context of this specification, the following is applied

generate [options] INPUT\_FILTER + ENCODE\_FILTER + PACKAGE\_FILTER + MULTIPLEX\_FILTER

#### D.2.2.2 Specific Filters

Specific filters are for further study.

# D.3 MMBP-PLAY-API

### D.3.1 Introduction

The MMBP-PLAY-API is typically used by a messaging service client to playback an MMBP according to this specification.

### D.3.2 Filter Conpcept

#### D.3.2.1 Overview

The general methods defined in this clause allow playing back media resources for conforming MMBP with focus on the baseline MMBP Player Profile as defined in clause 6.2.

#### D.3.2.2 Specific Filters

Specific filters are for further study.