

ETSI TS 126 117 V18.2.0 (2024-05)



**5G;
5G Media Streaming (5GMS);
Speech and audio profiles
(3GPP TS 26.117 version 18.2.0 Release 18)**



Reference

RTS/TSGS-0426117vi20

Keywords

5G

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 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

<https://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our
Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2024.
All rights reserved.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <https://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	5
1 Scope	7
2 References	7
3 Definitions of terms, symbols and abbreviations	9
3.1 Terms.....	9
3.2 Symbols.....	9
3.3 Abbreviations	9
4 Overview	10
5 Media Capabilities.....	10
5.1 Introduction	10
5.2 Decoding Capabilities	10
5.3 Encoding Capabilities.....	11
5.4 Definition of simultaneous encoding and decoding capabilities	12
6 Operation Points	12
6.1 Introduction	12
6.2 Speech Operation Points	12
6.2.1 Introduction.....	12
6.2.2 AMR	12
6.2.2.1 Bitstream Encoding Requirements.....	12
6.2.2.2 Receiver Requirements	13
6.2.2.3 Sender Requirements	13
6.2.3 AMR-WB	13
6.2.3.1 Bitstream Requirements	13
6.2.3.2 Receiver Requirements	13
6.2.3.3 Sender Requirements	13
6.2.4 EVS.....	13
6.2.4.1 Bitstream Encoding Requirements.....	13
6.2.4.2 Receiver Requirements	13
6.2.4.3 Sender Requirements	14
6.3 Audio Operation Points	14
6.3.1 Introduction.....	14
6.3.2 eAAC+ stereo	14
6.3.2.1 Bitstream Encoding Requirements.....	14
6.3.2.2 Receiver Requirements	14
6.3.2.3 Sender Requirements	14
6.3.3 AMR-WB+	14
6.3.3.1 Bitstream Encoding Requirements.....	14
6.3.3.2 Receiver Requirements	14
6.3.3.3 Sender Requirements	15
6.3.4 xHE-AAC stereo.....	15
6.3.4.1 Bitstream Encoding Requirements.....	15
6.3.4.2 Receiver Requirements	15
6.3.4.3 Sender Requirements	15
6.3.5 IVAS.....	15
6.3.5.1 Bitstream Encoding Requirements.....	15
6.3.5.2 Receiver Requirements	15
6.3.5.3 Sender Requirements	16
6.3.6 AAC-ELDv2.....	16
6.3.6.1 Bitstream Encoding Requirements.....	16

6.3.6.2	Receiver Requirements	16
6.3.6.3	Sender Requirements	16
7	Mapping to 5GMS delivery	16
7.1	Introduction	16
7.2	AMR Media Profile	17
7.2.1	Mapping to ISO BMFF	17
7.2.2	Media Profile Definition	17
7.2.2.1	CMAF Track Definition	17
7.2.2.2	CMAF Switching Set and Media Profile Definition	17
7.2.2.3	Mapping to DASH Adaptation Set	17
7.2.2.4	Playback Requirements	17
7.2.2.5	Content Generation Requirements	18
7.3	AMR-WB Media Profile	18
7.3.1	Mapping to ISO BMFF	18
7.3.2	Media Profile Definition	18
7.3.2.1	CMAF Track Definition	18
7.3.2.2	CMAF Switching Set and Media Profile Definition	18
7.3.2.3	Mapping to DASH Adaptation Set	18
7.3.2.4	Playback Requirements	19
7.3.2.5	Content Generation Requirements	19
7.4	EVS Media Profile	19
7.4.1	Mapping to ISO BMFF	19
7.4.2	Media Profile Definition	20
7.4.2.1	CMAF Track Definition	20
7.4.2.2	CMAF Switching Set and Media Profile Definition	20
7.4.2.3	Mapping to DASH Adaptation Set	20
7.4.2.4	Playback Requirements	20
7.4.2.5	Content Generation Requirements	21
7.5	void	21
7.6	eAAC+ stereo Media Profile	21
7.6.1	Void	21
7.6.2	Media Profile Definition	21
7.6.2.1	CMAF Track Definition	21
7.6.2.2	CMAF Switching Set and Media Profile Definition	21
7.6.2.3	Mapping to DASH Adaptation Set	21
7.6.2.4	Playback Requirements	22
7.6.2.5	Content Generation Requirements	22
7.7	AMR-WB+ Media Profiles	22
7.7.1	Mapping to ISO BMFF	22
7.7.2	Media Profile Definition	23
7.7.2.1	CMAF Track Definition	23
7.7.2.2	CMAF Switching Set and Media Profile Definition	23
7.7.2.3	Mapping to DASH Adaptation Set	23
7.7.2.4	Playback Requirements	23
7.7.2.5	Content Generation Requirements	24
7.8	xHE-AAC Media Profile	24
7.8.1	CMAF Track Definition	24
7.8.2	CMAF Switching Set and Media Profile Definition	24
7.8.3	Mapping to DASH Adaptation Set	24
7.8.4	Playback Requirements	25
7.8.5	Content Generation Requirements	25
Annex A (informative):	Registration Information	26
A.1	3GPP Registered URIs	26
Annex B (informative):	Change history	27
History	28

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies speech and audio media capabilities, operation points and media profiles for 5G Media Streaming in the context of 3GPP services and deployments. Speech and audio media capabilities, operation points and media profiles are also provided for usage in other streaming applications.

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] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".
- [3] 3GPP TS 26.071: "Mandatory Speech Codec speech processing functions; AMR Speech CODEC; General description".
- [4] 3GPP TS 26.090: "Mandatory Speech Codec speech processing functions; Adaptive Multi-Rate (AMR) speech codec; Transcoding functions".
- [5] 3GPP TS 26.073: "ANSI-C code for the Adaptive Multi Rate (AMR) speech codec".
- [6] 3GPP TS 26.104: "ANSI-C code for the floating-point Adaptive Multi Rate (AMR) speech codec".
- [7] 3GPP TS 26.093: "Mandatory speech codec speech processing functions; Adaptive Multi-Rate (AMR) speech codec; Source controlled rate operation".
- [8] 3GPP TS 26.171: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; General description".
- [9] 3GPP TS 26.190: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; Transcoding functions".
- [10] 3GPP TS 26.173: "ANSI-C code for the Adaptive Multi Rate - Wideband (AMR-WB) speech codec".
- [11] 3GPP TS 26.204: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; ANSI-C code".
- [12] 3GPP TS 26.193: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; Source controlled rate operation".
- [13] 3GPP TS 26.441: "Codec for Enhanced Voice Services (EVS); General Overview".
- [14] 3GPP TS 26.442: "Codec for Enhanced Voice Services (EVS); ANSI C code (fixed-point)".
- [15] 3GPP TS 26.443: "Codec for Enhanced Voice Services (EVS); ANSI C code (floating-point)".
- [16] 3GPP TS 26.445: "Codec for Enhanced Voice Services (EVS); Detailed Algorithmic Description".
- [17] 3GPP TS 26.446: "Codec for Enhanced Voice Services (EVS); Adaptive Multi-Rate - Wideband (AMR-WB) backward compatible functions".

- [18] 3GPP TS 26.450: "Codec for Enhanced Voice Services (EVS); Discontinuous Transmission (DTX)".
- [19] 3GPP TS 26.401: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; General description".
- [20] 3GPP TS 26.402: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Additional decoder tools".
- [21] 3GPP TS 26.403: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Encoder specification; Advanced Audio Coding (AAC) part".
- [22] 3GPP TS 26.404: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Enhanced aacPlus encoder Spectral Band Replication (SBR) part".
- [23] 3GPP TS 26.405: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Encoder specification parametric stereo part".
- [24] 3GPP TS 26.410: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Floating-point ANSI-C code".
- [25] 3GPP TS 26.411: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Fixed-point ANSI-C code".
- [26] 3GPP TS 26.290: "Audio codec processing functions; Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Transcoding functions".
- [27] 3GPP TS 26.304: "Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Floating-point ANSI-C code".
- [28] 3GPP TS 26.273: "ANSI-C code for the fixed-point Extended Adaptive Multi-Rate - Wideband (AMR-WB+) speech codec".
- [29] 3GPP TS 26.244: "Transparent end-to-end streaming service; 3GPP file format (3GP)".
- [30] ISO/IEC 23000-19: "Information Technology Multimedia Application Format (MPEG-A) – Part 19: Common Media Application Format (CMAF) for segmented media".
- [31] ISO/IEC 23009-1:2022: "Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 1: Media presentation description and segment formats."
- [32] CTA-5003: "Web Application Video Ecosystem (WAVE): Device Playback Capabilities Specification" available here <https://cdn.cta.tech/cta/media/media/resources/standards/pdfs/cta-5003-final.pdf>.
- [33] 3GPP TS 26.244: "Transparent end-to-end streaming service; 3GPP file format (3GP)".
- [34] 3GPP TS 26.452: "Codec for Enhanced Voice Services (EVS); ANSI C code; Alternative fixed-point using updated basic operators".
- [35] 3GPP TS 26.447: "Codec for Enhanced Voice Services (EVS); Error concealment of lost packets".
- [36] 3GPP TS 26.511: "5G Media Streaming (5GMS); Profiles, Codecs and Formats".
- [37] ISO/IEC 23003-3: "Information technology — MPEG audio technologies — Part 3: Unified speech and audio coding".
- [38] ISO/IEC 23003-4: "Information technology — MPEG audio technologies — Part 4: Dynamic range control"
- [39] ISO/IEC 14496-12: "Information technology - Coding of audio-visual objects - Part 12: ISO base media file format"
- [40] ISO/IEC 14496-14 "Information technology – Coding of audio-visual objects – Part 14: MP4 file format".
- [41] 3GPP TS 26.250: "Codec for Immersive Voice and Audio Services - General overview"

- [42] 3GPP TS 26.252: "Codec for Immersive Voice and Audio Services - Test sequences"
- [43] 3GPP TS 26.253: "Codec for Immersive Voice and Audio Services - Detailed Algorithmic Description incl. RTP payload format and SDP parameter definitions"
- [44] 3GPP TS 26.254: "Codec for Immersive Voice and Audio Services - Rendering"
- [45] 3GPP TS 26.255: "Codec for Immersive Voice and Audio Services - Error concealment of lost packets"
- [46] 3GPP TS 26.256: "Codec for Immersive Voice and Audio Services - Jitter Buffer Management"
- [47] 3GPP TS 26.251: "Codec for Immersive Voice and Audio Services - C code (fixed-point)"
- [48] 3GPP TS 26.258: "Codec for Immersive Voice and Audio Services; C code (floating-point)"
- [49] ISO/IEC 14496-3: "Information technology — Coding of audio-visual objects — Part 3: Audio"

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Bitstream: A media bitstream that conforms to an audio/speech encoding format and certain Operation Point.

Media Profile: A combination of a Bitstream encapsulated into a media container suitable for 5G Media Streaming Delivery.

Operation Point: A collection of discrete combinations of different content formats and the encoding format.

Receiver: A receiver that can decode and render any bitstream that is conforming to a certain Operation Point.

Sender: An entity that can process and encode formats associated to an Operation Point.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

AAC	Advanced Audio Coding
ABR	Adaptive BitRate
AMR	Adaptive MultiRate
CMAF	Common Media Application Format
DASH	Dynamic Adaptive Streaming over HTTP
DRC	Dynamic Range Control
DTX	Discontinuous Transmission
EVS	Enhanced Voice Services
ISO BMFF	ISO Base Media File Format
HTTP	Hyper Text Transfer Protocol
SBR	Spectral Band Replication
URN	Universal Resource Name

4 Overview

The speech and audio media capabilities defined in this specification are primarily introduced in order to be used as content format in the context of 5G Media Streaming, but not restricted to this use case. Parameters for audio encoder/decoder, content format and transport are defined.

The present document defines:

- Media decoding capabilities: the requirements for a receiver in terms of decoding
- Media encoding capabilities: the requirements for a sender in terms of encoding
- Operation Points: A collection of discrete combinations of different content formats and the encoding formats. Operation Points are supported by
 - Bitstream Requirements: A media bitstream that conforms to an audio or speech encoding format and certain Operation Point.
 - Receiver Requirements: A function that can decode and playback any Bitstream that is conforming to a certain Operation Point in real-time.
 - Sender Requirements: A function that can process and encode any Bitstream that is conforming to a certain Operation Point in real-time.
- The integration of each Operation Point in 5G Media Streaming as defined in TS 26.501 [2] and TS 26.511 [36].

5 Media Capabilities

5.1 Introduction

This clause documents speech and audio media capabilities in terms of decoding capabilities.

5.2 Decoding Capabilities

The following speech media decoding capabilities are defined:

- **AMR**: All decoding requirements for the AMR speech codec as specified in 3GPP TS 26.071 [3], 3GPP TS 26.090 [4], 3GPP TS 26.073 [5] and 3GPP TS 26.104 [6]) including all 8 modes and source-controlled rate operation 3GPP TS 26.093 [7].
- **AMR-WB**: All decoding requirements for the AMR-WB codec as specified in 3GPP TS 26.171 [8], 3GPP TS 26.190 [9], 3GPP TS 26.173 [10] and 3GPP TS 26.204 [11] including all 9 modes and source-controlled rate operation 3GPP TS 26.193 [12].
- **EVS**: All decoding requirements for the EVS codec as specified in 3GPP TS 26.441 [13], 3GPP TS 26.445 [16], 3GPP TS 26.442 [14] and 3GPP TS 26.443 [15] as described below including functions for backwards compatibility with AMR-WB (3GPP TS 26.446 [17]) and discontinuous transmission (3GPP TS 26.450 [18]).

The following audio media decoding capabilities are defined:

- **eAAC+**: All decoding requirements for the eAAC+ audio codec as specified in 3GPP TS 26.401 [19], 3GPP TS 26.402 [20], 3GPP TS 26.410 [24] and 3GPP TS 26.411 [25].
- **AMR-WB+**: All decoding requirements for the AMR-WB+ audio codec as specified in 3GPP TS 26.290 [26], 3GPP TS 26.304 [27] and 3GPP TS 26.273 [28].

- **xHE-AACstereo**: All decoding requirements for the xHE-AAC stereo audio codec as specified in the MPEG-D USAC "Extended high efficiency AAC profile" as defined in ISO/IEC 23003-3 [37] as well as all processing requirements applicable to the MPEG-D DRC loudness control profile and to the dynamic range control profile, level 1 or higher, as specified in ISO/IEC 23003-4 [38].

NOTE: xHE-AAC® is a registered trademark of Fraunhofer in Germany and other countries and is used with Fraunhofer's permission.

- **IVAS**: All decoding and rendering requirements for the IVAS codec as specified in 3GPP TS 26.250 [x1], TS 26.252 [x2], TS 26.253 [x3], TS 26.254 [x4], TS 26.255 [x5], TS 26.256 [x6], TS 26.251 (fixed-point) [x7] or TS 26.258 (floating-point) [x8].

NOTE: The IVAS decoder supports decoding of streams encoded with EVS. Therefore support of IVAS media decoding capabilities implies support of EVS media decoding capabilities..

- **AAC-ELDv2**: the capability to decode MPEG-4 Low Delay AAC v2 Profile Level 2 bitstreams [x9] and to output it as 2-channel audio. Note that this profile contains the audio object types 23 (ER AAC LD), 39 (ER AAC ELD) and 44 (LD MPEG Surround).

5.3 Encoding Capabilities

The following speech media encoding capabilities are defined:

- **AMR**: The encoding requirements for the AMR speech codec as specified in 3GPP TS 26.401 [19], clause 7, as well as 3GPP TS 26.403 [21], 3GPP TS 26.404 [22] and 3GPP TS 26.405 [23].
- **AMR-WB**: The encoding requirements for the AMR-WB by one of the following methods:
 - according to 3GPP TS 26.173 [10]
 - according to 3GPP TS 26.204 [11];
 - the AMR-WB IO mode according to TS 26.442 [14] and TS 26.443 [15],
 - the AMR-WB IO mode according to TS 26.452 [34].
- **EVS**: The encoding requirements for the EVS codec by one of the following methods:
 - TS 26.442 [14] and TS 26.443 [15] encoding functions; or
 - TS 26.452 [34] encoding functions.

The following audio media encoding capabilities are defined:

- **eAAC+**: The encoding requirements for the AAC+ audio codec as specified 3GPP TS 26.401 [19], clause 7, as well as 3GPP TS 26.403 [21], 3GPP TS 26.404 [22] and 3GPP TS 26.405 [23].
- **AMR-WB+**: The encoding requirements for the AMR-WB+ audio codec by one of the following methods
 - according to 3GPP TS 26.273 [28]; or
 - according to 3GPP TS 26.304 [27].
- **xHE-AACstereo**: All encoding requirements for the xHE-AAC stereo audio codec as specified in the MPEG-D USAC "Baseline USAC" profile as defined in ISO/IEC 23003-3 [37] and with the additional requirements that all encoded media contains the required metadata sets conforming to the MPEG-D DRC loudness control profile or to the dynamic range control profile, level 1 or higher, as specified in ISO/IEC 23003-4 [38].

IVAS: All encoding requirements for the IVAS codec as specified in 3GPP TS 26.250 [x1], TS 26.252 [x2], TS 26.253 [x3], TS 26.251 (fixed-point) [x7] or TS 26.258 (floating-point) [x8].

NOTE: The IVAS encoder supports EVS encoding. Therefore support of IVAS media encoding capabilities implies support of EVS media encoding capabilities.

- **AAC-ELDv2**: the capability to encode MPEG-4 Low Delay AAC v2 Profile Level 2 according to ISO/IEC 14496-3 [x9]. Note that this profile contains the audio object types 23 (ER AAC LD), 39 (ER AAC ELD) and 44 (LD MPEG Surround).

5.4 Definition of simultaneous encoding and decoding capabilities

Multi-instance encoding and decoding capabilities are defined as follows:

- **<Media-Cap>-<N>**: the capability to support up to N simultaneous decoding or encoding instances, each supporting the decoding or encoding capability **<Media-Cap>**.

For example **EVS-2** decoding capability is the capability to simultaneously support 2 decoders with *EVS* media capabilities according to clause 5.2

6 Operation Points

6.1 Introduction

The speech and audio Operation Points defined in this clause are primarily introduced in order to be used as content format in the context of 5G Media Streaming, but not restricted to this use case.

An operation point is a combination of rendering formats and media decoding capabilities.

For each Operation Point, Bitstream and Receiver requirements are detailed in the remainder of clause 6.

Table 6.1 provides an overview of the Operation Points defined in the present document.

Table 6.1: Speech and Audio Operation Points

Operation Point name	Format Properties	Decoding and Encoding Capabilities	Reference
AMR speech	Sampling frequency: 8 kHz	<i>AMR</i>	6.2.2
AMR-WB speech	Sampling frequency: 16 kHz	<i>AMR-WB</i>	6.2.3
EVS mono	Sampling frequency: 8, 16, 32, 48 kHz	<i>EVS</i>	6.2.4
eAAC+ stereo	Sampling frequency: 32, 44.1, 48 kHz	<i>eAAC+</i>	6.3.2
AMR-WB+	Sampling frequency: 8, 16, 32, 48 kHz	<i>AMR-WB+</i>	6.3.3
xHE-AAC stereo	Sampling frequency: 32, 44.1, 48 kHz	<i>xHE-AAC stereo</i>	6.3.4

6.2 Speech Operation Points

6.2.1 Introduction

This clause defines speech operation points. For each operation point, the requirements for the bitstream as well as for the receiver are defined.

6.2.2 AMR

6.2.2.1 Bitstream Encoding Requirements

The following requirements apply to the **AMR** Operation Point.

- The sampling frequency shall be 8 kHz.
- The bitstream shall be encoded according to either 3GPP TS 26.073 [5] or 3GPP TS 26.104 [6].

Note that the bitstream produced by the AMR encoder consists of 20ms encoded speech frames.

6.2.2.2 Receiver Requirements

Receivers conforming to the **AMR** Operation Point shall support the *AMR* speech media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

6.2.2.3 Sender Requirements

Senders conforming to the **AMR** Operation Point shall support the *AMR* speech media encoding capability according to clause 5.3 in real-time for any speech source format with sampling frequency 8kHz.

6.2.3 AMR-WB

6.2.3.1 Bitstream Requirements

The following requirements apply to the **AMR-WB** Operation Point.

- The sampling frequency shall be 16 kHz.
- The bitstream shall be encoded by one of the following methods:
 - according to 3GPP TS 26.173 [10]
 - according to 3GPP TS 26.204 [11];
 - the AMR-WB IO mode according to TS 26.442 [14] and TS 26.443 [15],
 - the AMR-WB IO mode according to TS 26.452 [34].

Note that the bitstream produced by the AMR-WB encoder consists of 20 ms encoded speech frames.

6.2.3.2 Receiver Requirements

Receivers conforming to the **AMR-WB** Operation Point shall support the *AMR-WB* speech media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

6.2.3.3 Sender Requirements

Senders conforming to the **AMR-WB** Operation Point shall support the *AMR-WB* speech media encoding capability according to clause 5.3 in real-time for any speech source format with sampling frequency 16kHz.

6.2.4 EVS

6.2.4.1 Bitstream Encoding Requirements

The following requirements apply to the **EVS** Operation Point:

- The sampling frequency shall be one of the following: 8, 16, 32, 48 kHz.
- The bitstream shall be encoded according to one of the following methods
 - TS 26.442 [14] and TS 26.443 [15] encoding functions; or
 - TS 26.452 [34] encoding functions.

Note that the bitstream produced by the EVS encoder consists of 20ms encoded speech frames.

6.2.4.2 Receiver Requirements

Receivers conforming to the **EVS** Operation Point shall support the *EVS* speech media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

6.2.4.3 Sender Requirements

Senders conforming to the **EVS** Operation Point shall support the *EVS* speech media encoding capability according to clause 5.3 in real-time for any speech source format with sampling frequency 8, 16, 32, 48 kHz.

6.3 Audio Operation Points

6.3.1 Introduction

This clause defines audio operation points. For each operation point, the requirements for the bitstream as well as for the receiver are defined.

6.3.2 eAAC+ stereo

6.3.2.1 Bitstream Encoding Requirements

The following requirements apply to the **eAAC+ stereo** Operation Point.

- The sampling frequency shall be either 32 kHz, 44.1 kHz or 48 kHz.
- The bitstream shall be encoded according to 3GPP TS 26.401 [19], clause 7, as well as 3GPP TS 26.403 [21], 3GPP TS 26.404 [22] and 3GPP TS 26.405 [23].

NOTE: The specified eAAC+ encoder consists of AAC-LC with additional tools that can be enabled (SBR, PS and more), see [19].

6.3.2.2 Receiver Requirements

Receivers conforming to the **eAAC+ stereo** Operation Point shall support the *eAAC+* media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

NOTE: The eAAC+ decoder supports decoding of streams encoded with AAC-LC or aacPlus, see [19].

6.3.2.3 Sender Requirements

Senders conforming to the **eAAC+ stereo** Operation Point shall support the *eAAC+ stereo* audio media encoding capability according to clause 5.3 in real-time for any stereo audio source format with sampling frequency 32kHz, 44.1kHz, 48kHz.

6.3.3 AMR-WB+

6.3.3.1 Bitstream Encoding Requirements

The following requirements apply to the **AMR-WB+** Operation Point.

- The sampling frequency shall be either 8, 16, 32 or 48 kHz.
- The bitstream shall be encoded by one of the following methods
 - according to 3GPP TS 26.273 [28]; or
 - according to 3GPP TS 26.304 [27].

6.3.3.2 Receiver Requirements

Receivers conforming to the **AMR-WB+** Operation Point shall support the *AMR-WB+* media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

6.3.3.3 Sender Requirements

Senders conforming to the **AMR-WB+** Operation Point shall support the *AMR-WB+* audio media encoding capability according to clause 5.3 in real-time for any stereo audio source format with sampling frequency 8, 16, 32 or 48 kHz.

6.3.4 xHE-AAC stereo

6.3.4.1 Bitstream Encoding Requirements

The following requirements apply to the **xHE-AAC stereo** Operation Point.

- The sampling frequency shall be either 32 kHz, 44.1 kHz or 48 kHz.
- The bitstream shall be encoded according to the MPEG-D USAC "Baseline USAC" profile as defined in ISO/IEC 23003-3 [37] and shall contain the metadata sets conforming to the MPEG-D DRC loudness control profile or to the dynamic range control profile, level 1 or higher, as specified in ISO/IEC 23003-4 [38].

6.3.4.2 Receiver Requirements

Receivers conforming to the **xHE-AAC stereo** Operation Point shall support the *xHE-AAC stereo* media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

NOTE: The xHE-AAC decoder supports decoding of streams encoded with eAAC+ [19]. Therefore support of xHE-AAC stereo media decoding capabilities implies support of eAAC+ media decoding capabilities.

6.3.4.3 Sender Requirements

Senders conforming to the **xHE-AAC stereo** Operation Point shall support the xHE-AAC audio media encoding capability according to clause 5.3 in real-time for any stereo audio source format with sampling frequency 32kHz, 44.1kHz, or 48kHz.

6.3.5 IVAS

6.3.5.1 Bitstream Encoding Requirements

The following requirements apply to the **IVAS** Operation Point.

- The input audio format shall be either mono, stereo, binaural, multi-channel (5.1, 5.1.2, 5.1.4, 7.1, 7.1.4), scene-based (Ambisonics up to 3rd order), metadata-assisted spatial audio (MASA), object-based, a combined format of objects with scene-based (OSBA), or a combined format of objects with metadata-assisted spatial audio (OMASA).
- The sampling frequency shall be either 8 kHz (only EVS interoperable coding), 16 kHz, 32 kHz and 48 kHz (fullband audio content).
- The bitstream shall be encoded according to 3GPP TS 26.250, TS 26.252, TS 26.253, TS 26.251 (fixed-point) or TS 26.258 (floating-point).

NOTE: IVAS codec level setting is TBD.

6.3.5.2 Receiver Requirements

Receivers conforming to the **IVAS** Operation Point shall support the *IVAS* media decoding capability according to clause 5.2 and shall support rendering and playback of the decoded signal.

NOTE: The IVAS decoder supports decoding of streams encoded with EVS. Therefore support of *IVAS* media decoding capabilities implies support of *EVS* media decoding capabilities.

NOTE: IVAS codec level setting is TBD.

6.3.5.3 Sender Requirements

Senders conforming to the **IVAS** Operation Point shall support the **IVAS-Enc** media encoding capability according to clause 5.3 in real-time for the audio formats according to the supported IVAS codec level 1, 2 or 3 as either mono, stereo, binaural, multi-channel (5.1, 5.1.2, 5.1.4, 7.1, 7.1.4), scene-based (Ambisonics up to 3rd order), metadata-assisted spatial audio (MASA), and object-based with sampling frequency 8 kHz (only EVS interoperable coding), 16 kHz, 32 kHz and 48 kHz (fullband audio content).

NOTE: IVAS codec level setting is TBD.

6.3.6 AAC-ELDv2

6.3.6.1 Bitstream Encoding Requirements

The following requirements apply to the **AAC-ELDv2** Operation Point.

- The sampling frequency shall be either 32 kHz, 44.1 kHz or 48 kHz.
- The bitstream shall be encoded according to MPEG-4 Low Delay AAC v2 Profile Level 2 as specified in ISO/IEC 14496-3 [x9].

6.3.6.2 Receiver Requirements

Receivers conforming to the **AAC-ELDv2** Operation Point shall support the **AAC-ELDv2** media decoding capability according to clause 5.2 and shall support playback of the decoded signal.

6.3.6.3 Sender Requirements

Senders conforming to the **AAC-ELDv2** Operation Point shall support the **AAC-ELDv2** audio media encoding capability according to clause 5.3 in real-time for any stereo audio source format with sampling frequency 32kHz, 44.1kHz, or 48kHz.

7 Mapping to 5GMS delivery

7.1 Introduction

This clause defines the mapping of the Operation Points as defined in clause 6 to 5G Media Streaming delivery. In particular the following aspects are addressed:

- Encapsulation of a bitstream into an ISO BMFF track.
- Definition of media content and receivers conforming to media profile including:
 - Encapsulation of a bitstream into a CMAF track
 - Providing the content in a CMAF Switching Set
 - Mapping to DASH-based distribution
 - Playback Requirements for a receiver conforming to this media profile

7.2 AMR Media Profile

7.2.1 Mapping to ISO BMFF

If media is provided following the operation point **AMR** and is encapsulated in the ISO BMFF [39], then the file format track shall contain the sample entry `AMRSampleEntry` with `box_type` 'samr' as defined in TS 26.244 [29] clause 6.5 and conform to the requirements of the sample entry 'samr' as defined in TS 26.244 [29].

7.2.2 Media Profile Definition

7.2.2.1 CMAF Track Definition

If media is provided following the operation point **AMR** and is encapsulated in a CMAF track, then the CMAF track shall conform to clause 7.2.1, and conform to the general CMAF Track constraints in ISO/IEC 23000-19 [30] as well as the general audio track constraints defined in ISO/IEC 23000-19 [30], clause 10.

7.2.2.2 CMAF Switching Set and Media Profile Definition

If media is provided following the operation point **AMR** and is provided in a CMAF Switching Set, then every CMAF track in the CMAF Switching Set shall conform to clause 7.2.2.1, and shall conform to the general CMAF Switching Set constraints in ISO/IEC 23000-19 [30], clause 7. CMAF Switching Sets that follow these requirements conform to the CMAF AMR media profile 'camr' defined in this clause.

7.2.2.3 Mapping to DASH Adaptation Set

If media is provided following the operation point **AMR**, a CMAF Switching Set conforming to clause 7.2.2.2 may be provided in a DASH Media Presentation Description in an Adaptation Set, in that case, the Adaptation Set shall conform to the Adaptation Set constraints of the DASH profile for CMAF as defined in ISO/IEC 23009-1 [31]. The following parameters shall be present on Adaptation Set level and set:

- @codecs is set to 'samr'
- @mimeType is set to be compatible with "audio/mp4 profiles='camr' "
- @audioSamplingRate is set to '8000'

If the Adaptation Set conforms to the constraints for the **AMR** Operation Point as defined in this clause, then the @profiles parameter in the Adaptation Set may signal conformance to this Media Profile by using "urn:3GPP:audio:mp:amr".

7.2.2.4 Playback Requirements

For a receiver supporting the **AMR** media profile the following applies:

- It shall support the receiver requirements as documented in clause 6.2.2.2 for any CMAF Track conforming to the CMAF **AMR** media profile 'camr' as defined in clause 7.2.2.1.
- It shall support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF **AMR** media profile 'camr' as defined in clause 7.2.2.2, namely:
 - 8.2 Sequential Track Playback
 - 8.3 Random Access to Fragment
 - 8.4 Random Access to Time
 - 8.5 Switching Set Playback
 - 8.6 Regular Playback of Chunked Content

- 8.7 Regular Playback of Chunked Content, non-aligned append
- It should support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [29] for any content conforming to a CMAF Switching Set according to CMAF AMR media profile 'camr' as defined in clause 7.2.2.2, namely:
 - 8.9 Out-Of-Order Loading
 - 8.10 Overlapping Fragments
 - 8.12 Playback of Encrypted Content

7.2.2.5 Content Generation Requirements

For a transmitter supporting the AMR media profile the following applies:

- It shall support all media encoding capabilities for AMR as defined in clause 5.3.
- It shall support the sender requirements for AMR as defined in clause 6.2.2.3.
- It shall support the generation of a CMAF Track as defined in clause 7.2.2.1 that conforms to the CMAF Media Profile 'camr' as defined in clause 7.2.2.2.
- If used for Adaptive Bit Rate (ABR) distribution, it shall support the generation of a CMAF Switching Set as defined in clause 7.2.2.4.

7.3 AMR-WB Media Profile

7.3.1 Mapping to ISO BMFF

If media is provided following the operation point **AMR-WB** and is encapsulated in the ISO BMFF, then the file format track shall contain the `AMRSampleEntryBox` and shall conform to the requirements of the sample entry 'sawb' as defined in TS 26.244 [29] clause 6.5.

7.3.2 Media Profile Definition

7.3.2.1 CMAF Track Definition

If media is provided following the operation point **AMR-WB** and is encapsulated in a CMAF track, then the CMAF track shall conform to clause 7.3.1, and conform to the general CMAF Track constraints in ISO/IEC 23000-19 [30], clause 7 as well as the general audio track constraints defined in ISO/IEC 23000-19 [30], clause 10.

7.3.2.2 CMAF Switching Set and Media Profile Definition

If media is provided following the operation point **AMR-WB** and is provided in a CMAF Switching Set, then every CMAF track in the CMAF Switching Set shall conform to clause 7.3.2.1, and shall conform to the general CMAF Switching Set constraints in ISO/IEC 23000-19 [30], clause 7. CMAF Switching Sets that follow these requirements conform to the CMAF AMR WB media profile 'camw' defined in this clause.

7.3.2.3 Mapping to DASH Adaptation Set

If media is provided following the operation point **AMR-WB**, a switching set conforming to clause 7.3.2.2 may be provided in a DASH Media Presentation Description in an Adaptation Set, in that case, the Adaptation Set shall conform to the Adaptation set constraints of the DASH profile for CMAF as defined in ISO/IEC 23009-1 [31] clause 8.12.4.3. The following parameters shall be present on Adaptation Set level:

- `@codecs` is set to 'sawb'
- `@mimeType` is set to be compatible with "audio/mp4 profiles='camw' "

- @audioSamplingRate is set to '16000'

If the Adaptation Set conforms to the constraints for the **AMR-WB** Operation Point as defined in this clause, then the @profiles parameter in the Adaptation Set may signal conformance to this Media Profile by using "urn:3GPP:audio:mp:amr-wb".

7.3.2.4 Playback Requirements

For a receiver supporting the AMR-WB media profile the following applies:

- It shall support the receiver requirements as documented in clause 6.2.3.2 for any CMAF Track conforming to the CMAF AMR-WB media profile 'camw' as defined in clause 7.3.2.2.
- It shall support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF AMR-WB media profile 'camw' as defined in clause 7.3.2.2, namely:
 - 8.2 Sequential Track Playback
 - 8.3 Random Access to Fragment
 - 8.4 Random Access to Time
 - 8.5 Switching Set Playback
 - 8.6 Regular Playback of Chunked Content
 - 8.7 Regular Playback of Chunked Content, non-aligned append
- It should support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF AMR-WB media profile 'camw' as defined in clause 7.3.2.2, namely:
 - 8.9 Out-Of-Order Loading
 - 8.10 Overlapping Fragments
 - 8.12 Playback of Encrypted Content

7.3.2.5 Content Generation Requirements

For a transmitter supporting the AMR-WB media profile the following applies:

- It shall support all media encoding capabilities for AMR-WB as defined in clause 5.3.
- It shall support the sender requirements for AMR-WB as defined in clause 6.2.3.3.
- It shall support the generation of a CMAF Track as defined in clause 7.3.2.1 that conforms to the CMAF Media Profile 'camw' as defined in clause 7.3.2.2.
- If used for Adaptive Bit Rate (ABR) distribution, it shall support the generation of a CMAF Switching Set as defined in clause 7.3.2.4.

7.4 EVS Media Profile

7.4.1 Mapping to ISO BMFF

If media is provided following the operation point **EVS** and is encapsulated in the ISO BMFF, then the file format track shall contain the EVSSampleEntryBox with box_type and conform to the requirements of the sample entry 'sevs' as defined in TS 26.244 [29].

7.4.2 Media Profile Definition

7.4.2.1 CMAF Track Definition

If media is provided following the operation point **EVS** and is encapsulated in a CMAF track, then the CMAF track shall conform to clause 7.3.1, and conform to the general CMAF Track constraints in ISO/IEC 23000-19 [30], clause 7 as well as the general audio track constraints defined in ISO/IEC 23000-19 [30], clause 10.

7.4.2.2 CMAF Switching Set and Media Profile Definition

If media is provided following the operation point **EVS** and is provided in a CMAF Switching Set, then every CMAF track in the CMAF Switching Set shall conform to clause 7.4.2.1, and shall conform to the general CMAF Switching Set constraints in ISO/IEC 23000-19 [30], clause 7. A CMAF Switching Set that follows these requirements conforms to the CMAF EVS media profile 'cevs' defined in this clause.

7.4.2.3 Mapping to DASH Adaptation Set

If media is provided following the operation point **EVS** and is provided in a DASH Media Presentation in an Adaptation Set, a switching set conforming to clause 7.4.2.2 may be provided in a DASH Media Presentation Description in an Adaptation Set. In that case, the Adaptation Set shall conform to the Adaptation set constraints of the DASH profile for CMAF as defined in ISO/IEC 23009-1 [31]. The following parameters shall be present on Adaptation Set level:

- @codecs is set to 'sevs'
- @mimeType is set to be compatible with "audio/mp4 profiles='cevs' "
- @audioSamplingRate is set to one of the following: '8000', '16000', '24000', '32000'

If the Adaptation Set conforms to the constraints for the **EVS** Operation Point as defined in this clause, then the @profiles parameter in the Adaptation Set may signal conformance to this Media Profile by using "urn:3GPP:audio:mp:evs.

7.4.2.4 Playback Requirements

For a receiver supporting the EVS media profile the following applies:

- It shall support the receiver requirements as documented in clause 6.2.4.2 for any CMAF Track conforming to the CMAF EVS media profile 'cevs' as defined in clause 7.4.2.2.
- It shall support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF EVS media profile 'cevs' as defined in clause 7.4.2.2, namely:
 - 8.2 Sequential Track Playback
 - 8.3 Random Access to Fragment
 - 8.4 Random Access to Time
 - 8.5 Switching Set Playback
 - 8.6 Regular Playback of Chunked Content
 - 8.7 Regular Playback of Chunked Content, non-aligned append
- It should support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF EVS media profile 'cevs' as defined in clause 7.2.2.2, namely:
 - 8.9 Out-Of-Order Loading
 - 8.10 Overlapping Fragments

- 8.12 Playback of Encrypted Content

7.4.2.5 Content Generation Requirements

For a transmitter supporting the EVS media profile the following applies:

- It shall support all media encoding capabilities for EVS as defined in clause 5.3.
- It shall support the sender requirements for EVS as defined in clause 6.2.4.3.
- It shall support the generation of a CMAF Track as defined in clause 7.4.2.1 that conforms to the CMAF Media Profile 'cevs' as defined in clause 7.4.2.2.
- If used for Adaptive Bit Rate (ABR) distribution, it shall support the generation of a CMAF Switching Set as defined in clause 7.4.2.2.

7.5 void

7.6 eAAC+ stereo Media Profile

7.6.1 Void

7.6.2 Media Profile Definition

7.6.2.1 CMAF Track Definition

If media is provided following the operation point **eAAC+ stereo** and is encapsulated in a CMAF track, then the CMAF track shall conform to and contain the MP4AudioSampleEntry 'mp4a' as defined in ISO/IEC 14496-14 [40], the general CMAF Track constraints in ISO/IEC 23000-19 [30], clause 7, the general audio track constraints defined in ISO/IEC 23000-19 [30], clause 10 as well as AAC core constraints in clause 10 of ISO/IEC 23000-19 [30].

NOTE: A CMAF Track conforming to eAAC+ stereo media profile also conforms to the xHE-AAC Media Profile as defined in clause 7.8. Consequently, such CMAF Track can also be played back by receivers conforming to the xHE-AAC Media Profile.

7.6.2.2 CMAF Switching Set and Media Profile Definition

If media is provided following the operation point **eAAC+ stereo** and is provided in a CMAF Switching Set, then every CMAF track in the CMAF Switching Set shall conform to clause 7.6.2.1, and the tracks shall conform to the general CMAF Switching Set constraints in ISO/IEC 23000-19 [30], clause 7 as well as the AAC core Switching Set constraints in clause 10.5 of ISO/IEC 23000-19 [30]. A CMAF Switching Set following these requirements is defined as the CMAF eAAC+ stereo media profile 'ceac'.

7.6.2.3 Mapping to DASH Adaptation Set

If media is provided following the operation point **eAAC+ stereo**, a switching set conforming to clause 7.6.2.2 may be provided in a DASH Media Presentation Description in an Adaptation Set. In that case, the Adaptation Set shall conform to the Adaptation set constraints of the DASH profile for CMAF as defined in ISO/IEC 23009-1 [31] clause 8.12.4.3. The following parameters shall be present on Adaptation Set level and set:

- @codecs is set to 'mp4a'
- @mimeType is set to be compatible with "audio/mp4 profiles='ceac'"
- @audioSamplingRate is set to '32000', '44100', or '48000'

If the Adaptation Set conforms to the constraints for the **eAAC+ stereo** Operation Point as defined in this clause, then the @profiles parameter in the Adaptation Set may signal conformance to this Media Profile by using "urn:3GPP:audio:mp:eAAC+ ".

NOTE: A DASH Adaptation Set conforming to eAAC+ stereo media profile conforms to the xHE-AAC DASH Adaptation Set as defined in clause 7.8. Hence, such DASH Adaptation Set can also be played back by receivers conforming to the xHE-AAC media profile.

7.6.2.4 Playback Requirements

For a receiver supporting the **eAAC+ stereo** media profile the following applies:

- It shall support the receiver requirements as documented in clause 6.3.2.2 for any CMAF Track conforming to the CMAF eAAC+ stereo media profile 'ceac' as defined in clause 7.6.2.2.
- It shall support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF eAAC+ stereo media profile 'ceac' as defined in clause 7.6.2.2, namely:
 - 8.2 Sequential Track Playback
 - 8.3 Random Access to Fragment
 - 8.4 Random Access to Time
 - 8.5 Switching Set Playback
 - 8.6 Regular Playback of Chunked Content
 - 8.7 Regular Playback of Chunked Content, non-aligned append
- It should support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF eAAC+ stereo media profile 'ceac' as defined in clause 7.6.2.2, namely:
 - 8.9 Out-Of-Order Loading
 - 8.10 Overlapping Fragments
 - 8.12 Playback of Encrypted Content

7.6.2.5 Content Generation Requirements

For a transmitter supporting the eAAC+ stereo media profile the following applies:

- It shall support all media encoding capabilities for eAAC+ stereo as defined in clause 5.3.
- It shall support the sender requirements for eAAC+ stereo as defined in clause 6.3.2.3.
- It shall support the generation of a CMAF Track as defined in clause 7.6.2.1 that conforms to the CMAF Media Profile 'ceac' as defined in clause 7.6.2.2.
- If used for Adaptive Bit Rate (ABR) distribution, it shall support the generation of a CMAF Switching Set as defined in clause 7.6.2.2.

7.7 AMR-WB+ Media Profiles

7.7.1 Mapping to ISO BMFF

If media is provided following the operation point **AMR-WB+** and is encapsulated in the ISO BMFF, then the file format track shall contain the AMRWPSampleEntry with box_type and conform to the requirements of the sample entry 'sawp' as defined in TS 26.244 [29] clause 6.9.

7.7.2 Media Profile Definition

7.7.2.1 CMAF Track Definition

If media is provided following the operation point **AMR-WB+** and is encapsulated in a CMAF track, then the CMAF track shall conform to clause 7.7.1 and the general CMAF Track constraints in ISO/IEC 23000-19 [30], clause 7 as well as the general audio track constraints defined in ISO/IEC 23000-19, clause 10.

7.7.2.2 CMAF Switching Set and Media Profile Definition

If media is provided following the operation point **AMR-WB+** and is provided in a CMAF Switching Set, then every CMAF track in the CMAF Switching Set shall conform to the requirements of clause 7.7.2.1 and the general CMAF Switching Set constraints in ISO/IEC 23000-19 [30], clause 7. A CMAF Switching Set following these requirements is defined as the CMAF AMR-WB+ media profile 'camp'.

7.7.2.3 Mapping to DASH Adaptation Set

If media is provided following the operation point **AMR-WB+**, a switching set conforming to clause 7.7.2.2 may be provided in a DASH Media Presentation in an Adaptation Set. In that case, the Adaptation Set shall conform to the Adaptation set constraints of the DASH profile for CMAF as defined in ISO/IEC 23009-1 [31] clause 8.12.4.3. The following parameters shall be present on Adaptation Set level:

- @codecs is set to 'sawp'
- @mimeType is set to be compatible with "audio/mp4 profiles='camp' "
- @audioSamplingRate is set to any of the following values: '8000', '16000', '32000', or '38400'

If the Adaptation Set conforms to the constraints for the **AMR-WB+** Operation Point as defined in this clause, then the @profiles parameter in the Adaptation Set may signal conformance to this Media Profile by using "urn:3GPP:audio:mp:amr-wb+".

7.7.2.4 Playback Requirements

For a receiver supporting the AMR-WB+ media profile the following applies:

- It shall support the receiver requirements as documented in clause 6.3.2.2 for any CMAF Track conforming to the CMAF AMR-WB+ stereo media profile 'camp' as defined in clause 7.7.2.2.
- It shall support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF AMR-WB+ media profile 'camp' as defined in clause 7.7.2.2, namely:
 - 8.2 Sequential Track Playback
 - 8.3 Random Access to Fragment
 - 8.4 Random Access to Time
 - 8.5 Switching Set Playback
 - 8.6 Regular Playback of Chunked Content
 - 8.7 Regular Playback of Chunked Content, non-aligned append
- It should support the following playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF AMR-WB media profile 'camp' as defined in clause 7.7.2.2, namely:
 - 8.9 Out-Of-Order Loading
 - 8.10 Overlapping Fragments

- 8.12 Playback of Encrypted Content

7.7.2.5 Content Generation Requirements

For a transmitter supporting the AMR-WB+ media profile the following applies:

- It shall support all media encoding capabilities for AMR-WB+ stereo as defined in clause 5.3.
- It shall support the sender requirements for AMR-WB+ as defined in clause 6.3.3.3.
- It shall support the generation of a CMAF Track as defined in clause 7.7.2.1 that conform to the CMAF Media Profile 'cawp' as defined in clause 7.7.2.2.
- If used for Adaptive Bit Rate (ABR) distribution, it shall support the generation of a CMAF Switching Set as defined in clause 7.7.2.2.

7.8 xHE-AAC Media Profile

7.8.1 CMAF Track Definition

If media is provided following the operation point **xHE-AAC stereo** and is encapsulated in a CMAF track, then the CMAF track shall conform to the general CMAF Track constraints in ISO/IEC 23000-19:2023 [30], clause 7, the general audio track constraints defined in ISO/IEC 23000-19 [30], clause 10, as well as MPEG-D USAC track format constraints defined in ISO/IEC 23000-19 [30], Annex K. As specified in ISO/IEC 23000-19 [30], Annex K, the MP4AudioSampleEntry shall be present with name `mp4a`.

7.8.2 CMAF Switching Set and Media Profile Definition

If media is provided following the operation point **xHE-AAC stereo** and is provided in a CMAF Switching Set, then every CMAF track in the CMAF Switching Set shall conform to clause 7.8.1 and the tracks shall conform to the general CMAF Switching Set constraints in ISO/IEC 23000-19 [30], clause 7 as well as the AAC core Switching Set constraints in clause 10.5 of ISO/IEC 23000-19 [30].

A CMAF Switching Set following these requirements is defined as the CMAF USAC stereo media profile 'casu'.

7.8.3 Mapping to DASH Adaptation Set

If media is provided following the operation point **xHE-AAC stereo** and is provided in a DASH Media Presentation in an Adaptation Set, then the following requirements apply:

- Content representations shall comply with the USAC stereo CMAF media profile 'casu', as defined in ISO/IEC 23000-19 [30] annex K.
- Content representations shall comply with the DASH Profile for CMAF content as defined in ISO/IEC 23009-1:2022 [31]
- If the **ChannelConfiguration** parameter is present in the Movie header, then the identical channel configuration shall be signaled by means of the AudioChannelConfiguration element in the MPD, according to the values specified in ISO/IEC 23000-19 [30] Table K.2.
- @audioSamplingRate is set to '32000', '44100', or '48000'

If the Adaptation Set conforms to the constraints for the **xHE-AAC stereo** Operation Point as defined in this clause, then the @profiles parameter in the Adaptation Set may signal conformance to this Media Profile by using "urn:3GPP:audio:mp:xHE-AAC".

7.8.4 Playback Requirements

For a receiver supporting the **xHE-AAC** media profile the following applies:

- It shall support the receiver requirements as documented in clause 6.3.4.2 for any CMAF Track conforming to the CMAF USAC stereo media profile 'casu' as defined in clause 7.8.2.
- It should support the audio related playback requirements as documented in clause 8 of CTA-WAVE 5003 [32] for any content conforming to a CMAF Switching Set according to CMAF USAC stereo media profile 'casu' as defined in clause 7.8.2.

7.8.5 Content Generation Requirements

For a transmitter supporting the **xHE-AAC** media profile the following applies:

- It shall support all media encoding capabilities for xHE-AAC stereo as defined in clause 5.3.
- It shall support the sender requirements for xHE-AAC stereo as defined in clause 6.3.4.3.
- It shall support the generation of a CMAF Track as defined in clause 7.8.1 that conforms to the CMAF Media Profile 'casu' as defined in clause 7.8.2.
- If used for Adaptive Bit Rate (ABR) distribution, it shall support the generation of a CMAF Switching Set as defined in clause 7.8.2.

Annex A (informative): Registration Information

A.1 3GPP Registered URIs

The clause documents the registered URIs in the present document following the process in <http://www.3gpp.org/specifications-groups/34-uniform-resource-name-urn-list>

Table A-1 lists all registered URN values as well as:

- a brief description of its functionality;
- a reference to the specification or other publicly available document (if any) containing the definition;
- the name and email address of the person making the application; and
- any supplementary information considered necessary to support the application.

Table A-1: 3GPP Registered URNs

URN	Description	Reference	Contact	Remarks
urn:3GPP:audio:mp:amr	AMR Media Profile	TS 26.117, clause 7.2.2.3	Thomas Stockhammer tsto@qti.qualcomm.com	none
urn:3GPP:audio:mp:amr-wb	AMR-WB Media Profile	TS 26.117, clause 7.3.2.3	Thomas Stockhammer tsto@qti.qualcomm.com	none
urn:3GPP:audio:mp:evs	EVS Media Profile	TS 26.117, clause 7.4.2.3	Thomas Stockhammer tsto@qti.qualcomm.com	none
urn:3GPP:audio:mp:eAAC+	eAAC+ stereo Media Profile	TS 26.117, clause 7.6.2.3	Thomas Stockhammer tsto@qti.qualcomm.com	none
urn:3GPP:audio:mp:amr-wb+	AMR-WB+ Media Profile	TS 26.117, clause 7.7.2.3	Thomas Stockhammer tsto@qti.qualcomm.com	none
urn:3GPP:audio:mp:xHE-AAC	xHE-AAC Media Profile	TS 26.117, clause 7.8.3	Frédéric Gabin frederic.gabin@dolby.com	none

Annex B (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2019-12	SA#86	SP-190990				Presented to TSG SA#86 (for information)	1.0.0
2020-01	SA4#107	S4-200245				Version agreed by TSG SA WG 4 to be sent for SA approval	1.1.0
2020-03	SA#87-e	SP-200049				Presented to TSG SA#87-e (for approval)	2.0.0
2020-03	SA#87-e	SP-200049				Approved by TSG SA#87-e	16.0.0
2022-04	-	-	-	-	-	Update to Rel-17 version (MCC)	17.0.0
2023-03	SA#99-	SP-230251	000 1	4	B	Introduction of xHE-AAC stereo audio operation point	18.0.0
2023-06	SA#100	SP-230552	000 2	-	F	Corrections to references	18.1.0
2024-03	SA#103	SP-240462	000 8	4	A	[5GMS3] Correction on Audio encapsulation in ISO BMFF, 3GP file format, CMAF and DASH	18.2.0
2024-03	SA#103	SP-240046	000 5	4	B	On MeCAR Audio capabilities	18.2.0

History

Document history		
V18.2.0	May 2024	Publication