

INTERNATIONAL STANDARD

**Digital living network alliance (DLNA) home networked device interoperability
guidelines –
Part 2: Media format profiles**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL LIVING NETWORK ALLIANCE (DLNA) HOME NETWORKED
DEVICE INTEROPERABILITY GUIDELINES –****Part 2: Media Format Profiles**

FOREWORD

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International Standard IEC 62481-2 has been prepared under technical area 8: Multimedia home systems and applications for end-user network, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 2013, and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) removal of optional media format profiles for Audio and AV content;
- b) addition of mandatory media format profiles for the CVP-2 Device Profile;
- c) includes updates to resolve interoperability issues.

The text of this International Standard is based on the following documents:

CDV	Report on voting
100/2731/CDV	100/2881/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

It is envisioned that in the home network environment, devices will be capable of exchanging content items that originate from different sources. Content items will typically come encoded in different formats. The term "format" designates the compression and encoding tools utilized to generate the binary instance of a content item, which will be eventually exchanged over the home network using streaming or file transfer protocols. Examples of formats include MPEG-2, MPEG-4, WMV and others for video; or MP3, AAC, WMA and others for audio.

Formats alone, however, include as part of their specifications, multiple parameters, features and tools which can be used in a myriad of combinations to generate content binaries. In this standard, the notion of a Media Format Profile is introduced to identify a particular suitable combination of format parameters which define a way for representing content binaries. A format like MPEG-2 for example, can have multiple Media Format Profiles depending on selections for the companion audio, the system-layer multiplexing specifications, allowed frame resolutions, allowed aspect ratios, allowed bitrates, etc.

The number of potential combinations for suitable Media Format Profiles increases rather quickly, as evidenced by the long profile lists observed in the different clauses and subclauses of this standard. Consequently, this standard introduces the notion of Mandatory Media Format Profiles, supported by all devices, as a means to provide baseline content interoperability in the home.

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DIGITAL LIVING NETWORK ALLIANCE (DLNA) HOME NETWORKED DEVICE INTEROPERABILITY GUIDELINES –

Part 2: Media Format Profiles

1 Scope

This part of DLNA guidelines describes DLNA Media Format Profiles applicable to the DLNA Device Classes defined in IEC 62481-1-1:2017. Media Format Profiles are defined for each of the following Media Classes: Audio, Image, and AV. In addition, Profile ID values that identify media collections are also introduced.

The Profile ID is exposed in a server's Content Directory Service (CDS) to signal potential networked players or renderers the existence of a content item with particular coding and compression features defined precisely by the item's Profile ID.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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Dolby, Meridian Lossless Packing, *Technical Reference for FBA and FBB streams*, Dolby Laboratories, Inc.
<http://www.dolby.com>

OC-SP-ETV-AM1.0.1-120614 "OpenCable™ 5 Enhanced TV Application Messaging Protocol 1.0", <http://www.cablelabs.com/specifications/OC-SP-ETV-AM1.0-I06-110128.pdf>

OMA (Open Mobile Alliance), *OMA Multimedia Messaging Service*

SMPTE 421M, *VC-1 Compressed Video Bitstream Format and Decoding Process*

SMPTE RP227, *VC-1 Bitstream Transport Encodings*

SMPTE ST 2052-1:2010, *Timed Text Format (SMPTE TT)*
<http://standards.smpite.org/>

⁴ Dolby® TrueHD is a trade name of a product supplied by Dolby Laboratories, Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named.

⁵ OpenCable is a trademark of a product supplied by Cable Television Laboratories, Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named.

WMA Specifications

Can be obtained through the Windows Media 9 Series License Program

<http://wmlicense.smdisp.net/licenserequest/>

WMV9 specifications, *Windows Media 9 Series License Program*,

<http://wmlicense.smdisp.net/licenserequest/>

W3C PNG:2003, *Portable Network Graphics (PNG) Specification (Second Edition) Information technology – Computer graphics and image processing – Portable Network Graphics (PNG): Functional specification*, ISO/IEC 15948, W3C.

<http://www.w3.org/TR/2003/REC-PNG-20031110>

3GPP TS 26.244, *3GPP* file format (3GP)*, 3GPP

<http://www.3gpp.org/ftp/Specs/html-info/26244.htm>

3 Terms, definitions, abbreviated terms and conventions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

3DFC

3D Frame Compatible – 3D video delivered in a multiplexed format that is compatible with 2D video encoding

3.1.2

3GPP

3rd Generation Partnership Project

this term also refers to a file format designed by this organization and used to encapsulate data

3.1.3

AC-3

Audio Codec 3

popularly known as Dolby® Digital, an audio format standard for delivering up to 5.1 audio channels developed by Dolby Laboratories⁶

3.1.4

ARIB

Association of Radio Industries and Businesses

one of the standards' bodies for digital television broadcasting

⁶ Dolby Digital and AC-3 are the tradenames of technologies supplied by Dolby Laboratories. This information is given for the convenience of users of this standard and does not constitute an endorsement by IEC of the product named.

3.1.5**ATSC****Advanced Television Systems Committee**

standards body for digital television broadcasting

3.1.6**Audio Super Frame**

audio framing syntax used for transmission in DAB frames

3.1.7**AV****Audio with Video**

media content that contains both moving pictures and sound

3.1.8**AVC****Advanced Video Codec**

abbreviated term often used to refer to the H.264 video codec

3.1.9**Buried Data**

dithered noise shaping algorithm allowing auxiliary data inside a PCM bitstream

3.1.10**CDS****Content Directory Service**

UPnP service that provides network-based discovery of content

Note 1 to entry: The Content Directory Service specification is a standard UPnP DCP.

3.1.11**Comply****Conform**

to be in accordance with referenced requirements; where the reference includes both mandatory and optional requirements, only the mandatory elements are considered necessary for compliance, optional requirements continue to be optional

Note 1 to entry: Any variation from these expectations shall be specifically noted.

Note 2 to entry: "Comply with" can be used interchangeably with "conform to" (includes variations of complies, complying, compliant, compliance, conforms, conforming, conformant, conformance)

3.1.12**Content Source**

endpoint that places content onto the network for transfer to another endpoint

3.1.13**Content Receiver**

endpoint that consumes content received via a network transfer from another endpoint

3.1.14**Decoder Friendly Alignment Position**

position in the bitstream defined for decoder friendly alignment

Note 1 to entry: A Decoder Friendly Alignment Position is always a valid Transport Alignment Position.

3.1.15**Device Category**

group of Device Classes with the same environmental characteristics and sharing common System Usages that are enabling home networking use case scenarios

Note 1 to entry: Examples used within this standard are HND (Home Network Devices), MHD (Mobile Handheld Device), and HID (Home Infrastructure Device).

Note 2 to entry: While Device Classes are grouped within a Device Category, a single physical device can support Device Classes that fall into multiple Device Categories.

3.1.16

Device Class

defined by a set of Device Functions

Note 1 to entry: A Device Class specifies the features supported on a device regardless of its physical attributes. A single device can support multiple Device Classes. A DLNA device will support at least one Device Class and can support one or more Device Capabilities. A Device Class is the certifiable entity in DLNA.

Note 2 to entry: Examples used within this document are DMS (Digital Media Server) and DMP (Digital Media Player).

3.1.17

DLNA

Digital Living Network Alliance

organization that created these guidelines

3.1.18

DLNA Transport Packet

collectively refers to the three MPEG-2 Transport Stream packet formats defined by DLNA comprising a 188 B ISO MPEG-2 TS packet, a 192 B packet consisting of a 188 B ISO MPEG-2 TS packet preceded by a 4 B timestamp zero-value timestamp field, and a 192 B packet consisting of a 188 B ISO MPEG-2 TS packet preceded by a 4 B valid timestamp

3.1.19

DMC

Digital Media Controller

device class defined by DLNA

3.1.20

DMP

Digital Media Player

device class defined by DLNA

3.1.21

DMR

Digital Media Renderer

device class defined by DLNA

3.1.22

DMS

Digital Media Server

device class defined by DLNA

3.1.23

+DN+

Download Controller

device capability defined by DLNA

3.1.24

DVB

Digital Video Broadcast

standards body for digital television broadcasting

3.1.25**Elementary Stream**

coded video, coded audio, or other coded bitstream

Note 1 to entry: Elementary Stream is a general term for a coded bitstream.

3.1.26**EXIF****Exchangeable Image File**

standardized format for exchanging images

3.1.27**GIF**

Graphics Interchange Format is a bitmap image format that was introduced by CompuServe in 1987

3.1.28**HD****High Definition**

picture quality at HDTV level

3.1.29**HEVC****High-Efficiency Video Codec**

abbreviated term commonly used to refer to the MPEG-H Part 2 or H.265 video codec

3.1.30**HDTV****High Definition Television**

provides a higher quality display, with a vertical resolution display from 720p to 1080i and higher and an aspect ratio (the width to height ratio of the screen) of 16:9, for a viewing experience similar to watching a movie

3.1.31**HND****Home Network Device**

device category defined by DLNA

3.1.32**ID3****ID3v2**

general tagging format for audio that enables storage of metadata about the audio inside the audio file itself

Note 1 to entry: It is a tag mainly targeted at files encoded with MPEG-1/2 layer I, MPEG-1/2 layer II, MPEG-1/2 layer III, and MPEG-2.5, but might work with other types of encoded audio or as a stand-alone format for audio metadata.

3.1.33**IFO****INFORMATION file**

file containing information regarding a content item utilized in DVD content encoding and creation

3.1.34**JFIF****JPEG File Interchange Format**

standardized file format for the exchange of images

3.1.35

JPEG

Joint Photographic Experts Group

coding standard for compression of still images (pictures)

3.1.36

KO

KOrea

Korean media profiles, i.e. video content specifically created for the Korean market

LPCM

Linear Pulse Code Modulation

uncompressed audio encoding

3.1.37

M-DMC

MHD Digital Media Controller

device class defined by DLNA

3.1.38

M-DMP

MHD Digital Media Player

device class defined by DLNA

3.1.39

M-DMS

MHD Digital Media Server

device class defined by DLNA

3.1.40

Media Format

family of encoding algorithm that share similar features or characteristics

Note 1 to entry: For example the MPEG-4 family of AV encoding algorithms, the MPEG-2 family of encoding algorithms, or the WMV family of encoding algorithms.

3.1.41

Media Format Profile

particular instantiation of a Media Format

Note 1 to entry: Given one family of encoding algorithms, a particular combination of algorithms and encoding parameters results in content items encoded with very specific features. For example, given the MPEG-4 Media Format, a Media Format Profile results from the selection of AVC encoding at Main Profile and Level 3, AAC audio, and the MP4 file format.

3.1.42

Media Presentation

collection of data that establishes a bounded or unbounded presentation of media content

3.1.43

MHD

Mobile Handheld Device

device category defined by DLNA

3.1.44

MHP

Multimedia Home Platform

optional application interface used together with MPEG-2 transmissions

3.1.45**MIME****Multipurpose Internet Mail Extension**

standard system for identifying the type of data contained in a file

Note 1 to entry: MIME is an Internet protocol that allows sending binary files across the Internet as attachments to e mail messages. This includes graphics, photos, sound, video files, and formatted text documents.

3.1.46**MLP****Meridian Lossless Packing**

lossless compression codec for audio data

3.1.47**MP3****MPEG-1 layer 3 audio**

coding standard for compression of audio data

3.1.48**MP4****MPEG-4 file format**

format for storing audio, video and/or other data in a file

3.1.49**MPD****Media Presentation Description**

formalized description for a Media Presentation for the purpose of providing a streaming service

3.1.50**media content component**

continuous component of the media content with an assigned media component type that can be encoded individually into a media stream

3.1.51**MM****Media Management**

one of the architecture components of DLNA

3.1.52**Media Class**

multimedia objects, classified according to their purpose in Audio-only, Audio and Video, or Images

Note 1 to entry: These options constitute the 3 Media Classes defined in the DLNA guidelines.

Note 2 to entry: See: Media Format.

3.1.53**MPTS****Multiple Programme Transport Stream**

two or more distinct programmes which have been multiplexed into a single stream formatted to be a compliant MPEG Transport Stream

3.1.54**MSCP****MediaServer 1.0 Control Point**

UPnP AV control point that issues actions to an MSD

3.1.55

NA

North America

content specifically created for North American region

3.1.56

NTSC

National Television Systems Committee

standard for broadcast and reception of analogue television signals

3.1.57

PAL

Phase Alternating Line

standard for broadcast and reception of analogue television signals

PC

Personal Computer

general-purpose computer equipped with a microprocessor and designed to run commercial software (such as a word processor or World Wide Web browser) for an individual user

3.1.58

Profile Parameter Set

collection of compression, encoding, and encapsulation parameters that results in a valid object binary

Note 1 to entry: Each Media Format Profile defined in these guidelines is identified by its Profile ID. Each profile is defined selecting a subset of compression parameters, encoding parameters, and file format (or encapsulation) parameters. The implementer chooses certain parameters to produce a content object binary.

3.1.59

+PU+

Push Uploader

device capability defined by DLNA

3.1.60

QoS

Quality of Service

guarantees on the ability of a network to deliver predictable results

3.1.61

QVGA

Quarter VGA

display format used in digital cameras

3.1.62

Representation

collection and encapsulation of one or more media streams in a delivery format and associated with descriptive metadata

3.1.63

Render

reproduction of encoded content binary in a human recognizable manner

Note 1 to entry: The reproduction process can adjust the features of the content binary to the output characteristics of the device.

Note 2 to entry: An A/V bit stream in high definition can be readjusted into SD resolution for display in standard definition TV.

3.1.64**Rendering Endpoints**

Content Receiver devices with the capability of rendering the content they receive

Note 1 to entry: These devices could play the content at the time of the transfer, right after the transfer has finished, or at a later time after the transfer has finished.

Note 2 to entry: For the purpose of this standard, devices in the following Device Classes constitute the only known Rendering Endpoints: DMP, DMR and M-DMP.

3.1.65**RTP****Real Time Transport Protocol**

media transport that provides end-to-end network transport functions for transmitting real-time data, such as AV, and provides services such as payload type identification, sequence numbering, time-stamping, and delivery monitoring.

3.1.66**S3D****Stereoscopic 3-Dimensional**

term referring specifically to the two-view (L & R) approach as opposed to other multiview or 2D plus depth approaches.

3.1.67**SbS****Side-by-Side**

multiplexed 3DFC video, as illustrated by Figure 3.

3.1.68**SD****Standard Definition**

picture quality at a SDTV level

3.1.69**SDTV****Standard Definition Television**

mode of operation of digital television that provides standard quality display, with a vertical resolution display less than 720p and an aspect ratio of 4:3, resulting in a viewing experience similar or slightly better than today's analogue television

3.1.70**Serving Endpoints**

Content Source devices with the capability of making content available to any client device in the home network

Note 1 to entry: In order to make content available to other home devices, Content Source devices act as UPnP media servers.

Note 2 to entry: For the purpose of this standard, devices in the following Device Classes constitute the only known Serving Endpoints: DMS, M-DMS.

3.1.71**Single Programme Transport Stream**

MPEG Transport Stream containing a single program

SIT**Selection Information Table**

services and events carried by a partial TS

3.1.72

SVC

Scalable Video Coding

extension of the H.264/AVC video coding standard

3.1.73

Systems

<media formats> encapsulation and multiplexing protocol that allows the delivery of audio, and audio/video streams

Note 1 to entry: This layer provides rules for identifying individual audio and video components, rules for synchronizing audio and video components, and others.

3.1.74

TaB

Top-and-Bottom

multiplexed 3DFC video, as illustrated by Figure 2.

3.1.75

Tolerance

capability of an endpoint to decode, parse and gracefully ignore information that is not understood

Note 1 to entry: Used as a noun or as a verb, it indicates that when a particular endpoint (Serving or Rendering or even an Intermediate device) receives data packets, the endpoint tolerates information that it does not understand.

3.1.76

Transport Alignment Position

position in the bitstream defined for transport alignment

3.1.77

Transport Stream

collection of multiplexed audio, video, and data packets organized in one or more programmes (or services) in compliance with the MPEG-2 Systems specifications

3.1.78

UHD

Ultra-High Definition

picture quality at UHDTV level

3.1.79

UHDTV

Ultra-High Definition Television

provides a higher quality than HDTV, with a vertical display resolution higher than 1 080 pixels, typically 2 160 pixels (4K) or higher, and a typical aspect ratio (the width to height ratio of the screen) of 16:9, for a viewing experience similar to watching a movie

3.1.80

+UP+

Upload Controller

device capability defined by DLNA

3.1.81

Uploading Endpoints

Content Source devices with the capability of uploading content to certain devices in the home network

Note 1 to entry: When used as Uploading Endpoints, the devices cannot serve to any potential client devices in the network. Instead, they transfer content only to those devices capable of receiving uploads.

Note 2 to entry: A device that implements the +UP+ capability constitute Uploading Endpoints.

3.1.82**UPnP****Universal Plug and Play**

organization that defines some of the foundation standards for DLNA

3.1.83**Volumetric**

concept in 3D graphics where an image is rendered with volume as a 3D object using components in all three dimensions, X, Y and Z

3.1.84**Z-Space**

element of depth conveyed to the viewer through the horizontal disparity of the L and R views in a stereoscopic image

Note 1 to entry: In a three-dimensional grid, the dimensions are labelled X, Y and Z for width, height and depth.

3.2 Abbreviated terms

AAC	Advanced Audio Coding
ADTS	Audio Data Transport Stream
AOT	Audio Object Types
ASF	Advanced System Format
BIFS	Binary Format for Scenes
BP	Baseline Profile
CAT	Conditional Access Table
CBR	constant bitrate
CFF	common file format
CIF	Common Intermediate Format
CRC	cyclic redundancy check
DASH	Dynamic Adaptive Streaming over HTTP
DCP	device control protocol
DECE	Digital Entertainment Content Ecosystem
DIDL	Digital Item Declaration Language
DIT	Discontinuity Information Table
DPB	decoded picture buffer
DTS	decoding time stamp
DVD	digital versatile disc
DVD-VR	DVD video recording
EAS	Emergency Alert System
EDTV	enhanced-definition television
EIT	Event Information Table
ES	elementary streams
EU	European Union
fps	frames per second
GOP	group of pictures
HE-AAC	High Efficiency Advanced Audio Coding
HTTP	Hypertext Transfer Protocol
ID	identifier

IP	Internet Protocol
IPR	intellectual property rights
IRD	integrated receiver decoder
ISO	International Organization for Standardization
LC	Low Complexity (used with AAC)
LFE	low-frequency effects or low-frequency enhancement
LRG	LaRGe
MKV	MatrosKa Video
MF	media format
MPD	Media Presentation Description
MPEG	Moving Picture Experts Group
MPS	MPEG Surround
MPTS	Multiple-Programme Transport Streams
MULT5	MULTiple channels, up to 5.1 channels
MULT7	MULTiple channels, up to 7.1 channels
OSD	on-screen display
PAT	programme association table
PCR	programme clock reference
PES	Packetized Elementary Streams
PMT	Programme Map Table
PNG	Portable Network Graphics
PS	programme stream
PSI	programme-specific information
PSM	Programme Stream Map
PTS	presentation time stamp
QCIF	Quarter Common Intermediate Format
RDI	real-time data information
RRT	Region Rating Table
SAR	Storage Aspect Ratio
SBR	spectral band replication
SCR	system clock reference
SCTE	Society of Cable Telecommunications Engineers
SI	service information (in DVB specifications)
SI	system information (in SCTE specifications)
SM	small
SPTS	Single-Programme Transport Stream
STB	set-top box
STC	system time clock
TS	transport stream
TTS	timestamped transport stream
TV	television
URI	Uniform Resource Identifier
URN	Uniform Resource Name

UTF	Unicode Transformation Format
VBI	vertical blanking interval
VBR	variable bit rate
VC-1	video codec 1
VGA	Video Graphics Array
VOB	video object
VOP	video object plane
VSI	vendor-specific infoframe
W3C	World Wide Web Consortium
WM	Windows Media
WMA	Windows Media Audio ⁷
WMV	Windows Media Video ⁸
WMV9	Windows Media Version 9 Series
XHTML	XML Hypertext Markup Language
XML	Extensible Markup Language

3.3 Conventions

In IEC 62481-1-1:2017 and this standard, a number of terms, conditions, mechanisms, sequences, parameters, events, states, or similar terms are printed with the first letter of each word in uppercase and the rest lowercase (e.g., Move). Any lowercase uses of these words have the normal technical English meaning.

4 Guideline terminology and conventions

4.1 Guideline compliance classifiers

See 6.1 of IEC 62481-1-1:2017 for description of the guideline compliance classifiers.

4.2 Standard or specification usage classifiers

See 6.2 of IEC 62481-1-1:2017 for description of standards or specification usage classifiers.

4.3 Guideline font usage conventions

See 7.1 of IEC 62481-1-1:2017 for description of the guideline font usage conventions.

4.4 Layout for guidelines

See 6.1 of IEC 62481-1-1:2017 for description of the layout for the guidelines.

Additional layout applicable to this document:

[PROFILES] species a list of media profiles in bold font, that is applicable for the guideline subclause that follows.

⁷ WMA and WMV are tradenames of technologies supplied by Microsoft Corporation. This information is given for the convenience of users of this standard and does not constitute an endorsement by IEC of the product named.

4.5 Interoperability guidelines usage

See 5.9 of IEC 62481-1-1:2017 for description of the interoperability guideline usage.

5 Compendium of Media Format Profiles

5.1 Overview

This clause provides a comprehensive list of all Media Format Profiles defined for this version of the Media Format guidelines. The description includes the Profile ID values as well as a brief summary of features and usage scenarios.

Content objects exchanged according to the DLNA Home Network Device interoperability guidelines belong to one of the following Media Classes: image, audio, and AV. Each Media Class typically includes multiple Media Formats, and each Media Format can be instantiated according to multiple Media Format Profiles. This specification defines the particular Media Format Profiles based on strict selection of format parameters and features. Each Media Class typically includes multiple formats, and each format can be instantiated according to multiple Media Format Profiles. This document also contains Media Format Profiles for media collections. These profiles do not map into any of these Media Classes.

This clause contains a set of Tables which contain a summary of the various Media Format Profile definitions contained in this document. Each Table has the header shown below in Figure 1 and as described in the bulleted list.

Profile ID	Description	MIME type	Label	Usage scenarios
IEC SM	Profile for image media	image/jpeg	image	A profile used by multiple types of

IEC

Figure 1 – Profile summary Table header

Profile ID: Profiles are identified by an alphanumeric token that is known as the Profile ID. This parameter is used by DLNA specifications and implementations whenever devices need to advertise or reference a content item of a particular profile. This clause provides a comprehensive list of all Media Format Profiles, it describes their main features, and explains possible usage scenarios. Subsequent clauses of this guideline describe the strict specifications that define each of the profiles.

Description: A description of the Profile ID.

MIME type: The MIME Type to be utilized along with the DLNA Profile ID. Note that the MIME types defined for each of the profiles are always case-insensitive.

Label: A Categorization Label which helps identify related Profile IDs.

Usage scenarios: The rightmost column in the profile tables presented below describes existing and developing applicability scenarios for each of the DLNA Media Format Profiles. The description in this column should be considered complementary information on each profile. It is not intended to be an exhaustive list of all potential usage or applicability scenarios. In fact, many other usage scenarios might become applicable in the near future due to the emergence of new standards, new products, and new trends. In this column, the text in bold indicates applications or services whereas the text in italics indicates devices.

5.2 Categorization labels

The tables for DLNA Media Format Profiles presented in this subclause include a column called "Label". Table 1 defines the meaning of these labels. Three audio labels, two image labels, and five video labels have been defined to provide guidance on the expected complexity level of each of the defined format profiles. The audio labels differentiate between single-channel, 2-channel and multi channel scenarios. The video labels differentiate in terms of resolution; ranging from QCIF to High Definition (HD) scenarios. The image labels differentiate in terms of

the purpose of usage. For a given audio or AV profile, the label indicates the most complex scenario. Any given profile typically defines a range of scenarios, of which only the most complex is typically indicated by the label.

Table 1 – Categorization labels

Label name	Definition
2 ch	2-channel audio application scenarios
3DFC	3D frame-compatible A/V application scenarios
CIF15	medium resolution A/V application scenarios with lower frame rates
CIF30	medium resolution A/V application scenarios
HD	high resolution A/V application scenarios
Icon	image objects of different sizes used only for icon or thumbnail representations
Mono	Single channel audio application scenarios (speech)
Multi	Multi-channel audio application scenarios
Picture	image objects of different sizes used as content items
QCIF15	low resolution A/V application scenarios
SD	standard resolution A/V application scenarios
UHD	ultra-high resolution A/V application scenarios

5.3 Image Class: JPEG profiles

Table 2 describes the JPEG profiles of the DLNA Image Class.

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Table 2 – Image Class: JPEG profiles

Profile ID	Description	MIME type	Label	Usage scenarios
JPEG_SM	Profile for image Media Class content of small resolution	image/jpeg	picture	A profile used by multiple types of devices (cameras, cell phones, PCs) to represent small images in compressed format.
JPEG_MED	Profile for image Media Class content of medium resolution	image/jpeg	picture	A profile used by multiple types of devices (cameras, cell phones, PCs) to represent medium-size images in compressed format.
JPEG_LRG	Profile for image Media Class content of high resolution	image/jpeg	picture	A profile used by multiple types of devices (cameras, cell phones, PCs) to represent large images in compressed format.
JPEG_RES_<H>_<V>	Profile for image Media Class content. Values <H> and <V> indicate the horizontal and vertical resolutions in pixel numbers	image/jpeg	picture	A profile used by multiple types of devices (cameras, cell phones, PCs) to represent images in a compressed format.
JPEG_TN	Profile for image thumbnails	image/jpeg	icon	An image profile for images in thumbnail resolutions used to provide a compact visual representation (a companion image) of other media objects (images, audio, AV), using JPEG encoding. This profile is used by multiple types of devices ().
JPEG_SM_ICO	Profile for small icons	image/jpeg	icon	A profile used to represent small icons using JPEG image coding. This icon profile is used by multiple types of devices (cameras, cell phones, PCs) for UPnP device descriptions.
JPEG_LRG_ICO	Profile for large icons	image/jpeg	icon	A profile used to represent large icons using JPEG image coding. This icon profile is used by multiple types of devices (cameras, cell phones, PCs) for UPnP device descriptions.

5.4 Image Class: PNG profiles

Table 3 describes the PNG profiles of the DLNA Image Class.

Table 3 – Image Class: PNG profiles

Profile ID	Description	MIME type	Label	Usage scenarios
PNG_TN	Profile for image thumbnails	image/png	icon	An image profile for images in thumbnail resolutions used to provide a compact visual representation (a companion image) of other media objects (images, audio, AV), using PNG encoding. This profile is used by multiple types of devices (cameras, cell phones, PCs).
PNG_SM_ICO	Profile for small icons	image/png	icon	A profile used to represent small icons using PNG image coding. This icon profile is used by multiple types of devices (cameras, cell phones, PCs) for UPnP device descriptions.
PNG_LRG_ICO	Profile for large icons	image/png	icon	A profile used to represent large icons using PNG image coding. This icon profile is used by multiple types of devices (cameras, cell phones, PCs) for UPnP device descriptions.
PNG_LRG	Profile for Image Class content of high resolution	image/png	picture	A profile used by multiple types of devices (cameras, cell phones, PCs) to represent large images in compressed format.

5.5 Image Class: GIF profiles

Table 4 describes the GIF profiles of the DLNA Image Class.

Table 4 – Image Class: GIF profiles

Profile ID	Description	MIME type	Label	Usage scenarios
GIF_LRG	Profile for image Media Class content of high resolution.	Image/GIF	Picture	A profile used for images in compressed format. This profile is supported by multiple types of devices.

5.6 Audio Class: AC-3 profiles

Table 5 describes the AC-3 profiles of the DLNA Audio Class.

Table 5 – Audio Class: AC-3 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
AC3	Profile for audio Media Class content	audio/ac3	2-ch multi	A profile used for audio content, including multichannel audio content. A related format profile is used in DVD-Audio for backward compatible multichannel audio content.

5.7 Audio Class: DTS Digital Surround profiles

Table 6 describes the DTS Digital Surround profiles of the DLNA Audio Class.

Table 6 – Audio Class: DTS Digital Surround profiles

Profile ID	Description	MIME type	Label	Usage scenarios
DTS	Profile for audio Media Class content with up to 5.1 channels	audio/vnd.dts	2-ch multi	A profile used for creating multi-channel audio tracks. This profile is supported by Personal Audio Players, PCs, and devices in the home-entertainment ecosystem.

5.8 Audio Class: DTS-HD profiles

Table 7 – Audio Class: DTS-HD profiles

Profile ID	Description	MIME Type	Label	Usage Scenarios
DTSHD	Profile for audio Media Class with content up to 7.1 or 8.0 channels	audio/vnd.dts.hd	2-ch multi	A profile used for creating music and audio tracks. This profile is supported by A/V Receivers, mobile devices, televisions and other devices in the home entertainment and automotive ecosystems

5.9 Audio Class: Enhanced AC-3 profiles

Table 8 describes the Enhanced AC-3 profiles of the DLNA Audio Class.

Table 8 – Audio Class: Enhanced AC-3 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
EAC3	Profile for audio Media Class content.	audio/eac3	2-ch multi	A profile used for audio content, including multichannel audio content.
EAC3_ISO	Profile for Enhanced AC-3 audio, encapsulated in an ISO base media file	audio/mp4	2-ch multi	This profile is used for IP-delivered stereo and multichannel music content services.

5.10 Audio Class: LPCM profiles

Table 9 describes the LPCM profiles of the DLNA Audio Class.

Table 9 – Audio Class: LPCM profiles

Profile ID	Description	MIME type	Label	Usage scenarios
LPCM	Profile for audio Media Class content	audio/L16	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content. This profile is supported by CD players, audio systems, and PCs.

As shown in guideline 8.5.3.2, the use of MIME type audio/L16 requires additional parameters.

5.11 Audio Class: MLP profiles

Table 10 describes the MLP profiles of the DLNA Audio Class.

Table 10 – Audio Class: MLP profiles

Profile ID	Description	MIME type	Label	Usage scenarios
MLP	Profile for audio Media Class content.	audio/vnd.dolby.mlp	2-ch multi	A profile used for audio content, including multichannel audio content.
MLP_ISO	Profile for MLP audio, encapsulated in an ISO base media file	audio/mp4	2-ch multi	This profile is used for IP-delivered stereo and multichannel music content services

5.12 Audio Class: MPEG-1/2 profiles

Table 11 describes the MPEG 1/2 profiles of the DLNA Audio Class.

Table 11 – Audio Class: MPEG-1/2 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
MP2_MPS	Profile for audio Media Class content with up to 7.1 channels.	audio/mpeg	multi	A profile used to create recordings of Personal Content and Digital Radio Broadcasting. This profile is supported by Home Theatre Systems, Stereos, Car Radios and PCs.

5.13 Audio Class: MP3 profiles

Table 12 describes the MP3 profiles of the DLNA Audio Class.

Table 12 – Audio Class: MP3 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
MP3	Profile for audio Media Class content	audio/mpeg	2-ch	A profile used for creating recordings of music and voice for storage on devices and for Internet transmission. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.

5.14 Audio Class: MPEG-4 profiles

Table 13 describes the MPEG-4 profiles of the DLNA Audio Class.

Table 13 – Audio Class: MPEG-4 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
AAC_ADTS	Profile for audio Media Class content	audio/vnd.dlna.adts	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs. This profile is used by ARIB Radio.
AAC_ISO	Profile for audio Media Class content	audio/mp4 audio/3gpp	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs. A related format profile is used in iTunes. A related format profile is optional in DVB and 3GPP.
AAC_ADTS_320	Profile for audio Media Class content	audio/vnd.dlna.adts	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
AAC_ISO_320	Profile for audio Media Class content	audio/mp4 audio/3gpp	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
AAC_ADTS_192	Profile for audio Media Class content	audio/vnd.dlna.adts	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
AAC_ISO_192	Profile for audio Media Class content	audio/mp4 audio/3gpp	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
AAC_MULT5_ADTS	Profile for audio Media Class content with up to 5.1 channels	audio/vnd.dlna.adts	multi	A profile used for creating recording of Radio Broadcasts, and the Audio component of TV Broadcast. This profile is supported by Personal Audio Players and PCs.
AAC_MULT5_ISO	Profile for audio Media Class content with up to 5.1 channels	audio/mp4 audio/3gpp	multi	A profile used for creating multichannel recordings of audio. It is incorporated by reference in DLNA AV profiles.

Profile ID	Description	MIME type	Label	Usage scenarios
AAC_L6_ISO	Profile for AAC-LC 7.1-channel audio	audio/mp4	2-ch multi	AAC-LC 7.1-channel audio in MP4
AAC_MPS	Profile for audio Media Class content with up to 7.1 channels.	audio/mp4 audio/3gpp audio/vnd.dlna.adts	multi	A profile for creating recordings of Radio Broadcasts, Music Downloads and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones and PCs.
MPEG2_AAC_MPS	Profile for audio Media Class content with up to 7.1 channels.	audio/mp4 audio/3gpp audio/vnd.dlna.adts	multi	A profile for creating recordings of Radio Broadcasts, Music Downloads and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones and PCs.
HEAAC_L2_ADTS	Profile for audio Media Class content	audio/vnd.dlna.adts	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
HEAAC_L2_ISO	Profile for audio Media Class content	audio/mp4 audio/3gpp	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
HEAAC_L2_ADTS_320	Profile for audio Media Class content	audio/vnd.dlna.adts	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
HEAAC_L2_ISO_320	Profile for audio Media Class content	audio/mp4 audio/3gpp	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
HEAAC_L2_ISO_128	Profile for audio Media Class content	audio/mp4 audio/3gpp	2-ch	A profile used for creating recordings of Radio Broadcasts and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones, and PCs.
HEAAC_MULT5_ADTS	Profile for audio Media Class content with up to 5.1 channels	audio/vnd.dlna.adts	multi	A profile used for creating Multichannel Music Tracks from AV Content. A related format profile is expected to be used in DVD-A.

Profile ID	Description	MIME type	Label	Usage scenarios
HEAAC_MULT5_ISO	Profile for audio Media Class content with up to 5.1 channels	audio/mp4 audio/3gpp	multi	A profile used for creating Multichannel Music Tracks from AV Content. A related format profile is expected to be optional in 3GPP and DVB.
HEAAC_L4	Profile for audio Media Class content with up to 5.1 channels	audio/mp4 audio/3gpp audio/vnd.dlna.adts	multi	This profile is used for audio content delivery, recordings thereof and Personal Content. This profile is supported by Home Theatre Systems and PCs.
HEAAC_MPS	Profile for audio Media Class content with up to 7.1 channels	audio/mp4 audio/3gpp audio/vnd.dlna.adts	multi	A profile for creating recordings of Radio Broadcasts, Music Downloads and User Created Audio Content and for Digital Radio Broadcasting. This profile is supported by Personal Audio Players, Cellular Phones and PCs.
HEAACv2_L2	Profile for audio Media Class content	audio/mp4 audio/3gpp audio/vnd.dlna.adts	2-ch	A profile used for creating audio recordings for usage in online and mobile purchases, storage on physical distribution media, Radio Broadcasts and User Created Audio Content. This profile is supported by Personal Audio Players, Cellular Phones, PCs, set-top boxes, and IPTV receivers.
HEAACv2_L2_320	Profile for audio Media Class content	audio/mp4 audio/3gpp audio/vnd.dlna.adts	2-ch	A profile used for creating audio recordings for usage in online and mobile purchases, storage on physical distribution media, Radio Broadcasts and User Created Audio Content. This profile is supported by Personal Audio Players, Cellular Phones, PCs, set-top boxes, and IPTV receivers.
HEAACv2_L2_128	Profile for audio Media Class content	audio/mp4 audio/3gpp audio/vnd.dlna.adts	2-ch	A profile used for creating audio recordings for usage in online and mobile purchases, storage on physical distribution media, Radio Broadcasts and User Created Audio Content. This profile is supported by Personal Audio Players, Cellular Phones, PCs, set-top boxes, and IPTV receivers.
HEAACv2_L4	Profile for audio Media Class content with up to 5.1 channels	audio/mp4 audio/3gpp audio/vnd.dlna.adts	multi	This profile is used for audio content delivery, recordings thereof and Personal Content. This profile is supported by Home Theatre Systems and PCs.
HEAACv2_L6_ISO	Profile for HE AACv2 stereo and HE AAC 7.1-channel audio	audio/mp4	2-ch multi	HE AAC 7.1 multi-channel audio in MP4.

Profile ID	Description	MIME type	Label	Usage scenarios
HEAACv2_L2_MPS_DAB	Profile for audio Media Class content with up to 5.1 channels.	audio/x-dab	multi	A profile used for creating recording of Radio Broadcasts and for Digital Radio Broadcasting. This profile is supported by Stereos, Home Theatre Systems and Car Radios.

5.15 Audio Class: WMA profiles

Table 14 describes the WMA profiles of the DLNA Audio Class.

Table 14 – Audio Class: WMA profiles

Profile ID	Description	MIME type	Label	Usage scenarios
WMABASE	WMA content (bitrates less than 193 kbit/s)	audio/x-ms-wma	2-ch	A profile used for User Created Audio Content, Internet Music Services, and Internet Radio. This profile is supported by Personal Audio Players and PCs.
WMAFULL	WMA content	audio/x-ms-wma	2-ch	A profile used for User Created Audio Content, Internet Music Services, and Internet Radio. This profile is supported by Personal Audio Players and PCs.
WMAPRO	WMA professional version	audio/x-ms-wma	2-ch multi	A profile used by User Created Audio Content, and Internet Music Services. This profile is supported by Multichannel Audio Systems, and PCs.
WMALSL	WMA Lossless – stereo 16 bit, 2 channel	audio/x-ms-wma	2-ch	Stereo lossless playback – identical to source file.
WMALSL_MULT5	WMA Lossless – Surround 24 bit, 5.1 channel	audio/x-ms-wma	multi	Surround sound lossless playback – identical to source file.

5.16 AV Class: MPEG-2 profiles

Table 15 describes the MPEG-2 profiles of the DLNA AV Class.

Table 15 – AV Class: MPEG-2 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
MPEG_PS_NTSC	Profile for NTSC-formatted AV Class media	video/mpeg	SD	A profile used to create recordings of Broadcast TV and for content storage in DVDs. This profile is supported by DVD Players and PCs.
MPEG_PS_PAL	Profile for PAL-formatted AV Class media	video/mpeg	SD	A profile used to create recordings of Broadcast TV and for content storage in DVDs. This profile is supported by DVD Players and PCs.
MPEG_PS_SD_DTS	MPEG-2 Video wrapped in MPEG-2 Programme Stream, with DTS Digital Surround Audio	video/mpeg	SD	A profile for creating AV content. This profile is supported by Personal AV Players, PCs, and all devices in the home-entertainment eco-system.
MPEG_TS_SD_NA	North America region profile for Standard Definition AV Class utilizing a DLNA Transport Packet with zero value timestamp	video/vnd.dlna.mpeg-tts	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_NA_T	North America region profile for Standard Definition AV Class utilizing a DLNA Transport Packet with a valid non-zero timestamp	video/vnd.dlna.mpeg-tts	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_NA_ISO	North America region profile for Standard Definition AV Class utilizing a DLNA Transport Packet without a Timestamp field	video/mpeg	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_HD_NA	North America region profile for High Definition AV Class utilizing a DLNA Transport Packet with zero value timestamp	video/vnd.dlna.mpeg-tts	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_HD_NA_T	North America region profile for High Definition AV Class utilizing a DLNA Transport Packet with a valid non-zero timestamp	video/vnd.dlna.mpeg-tts	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.

Profile ID	Description	MIME type	Label	Usage scenarios
MPEG_TS_HD_NA_ISO	North America region profile for High Definition AV Class utilizing a DLNA Transport Packet without a Timestamp field	video/mpeg	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_NA_ISO	MPEG-2 HD/SD video wrapped in MPEG-2 Transport Stream as constrained by SCTE-43 standards, with AC-3 audio, without a timestamp field	video/mpeg	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_NA_3DFC_ISO	North America region profile for MPEG-2 HD 3Dframe-compatible video with AC-3 audio, utilizing a DLNA Transport Packet without a Timestamp field	video/mpeg	3DFC	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_KO	Korea region profile for Standard Definition AV utilizing a DLNA Transport Packet with zero value timestamp	video/vnd.dlna.mpeg-tts	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems with extensions for Korea. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_KO_T	Korea region profile for Standard Definition AV Class utilizing a DLNA Transport Packet with a valid non-zero timestamp	video/vnd.dlna.mpeg-tts	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems with extensions for Korea. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_KO_ISO	Korea region profile for Standard Definition AV Class utilizing a DLNA Transport Packet without a Timestamp field	video/mpeg	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems with extensions for Korea. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_HD_KO	Korea region profile for High Definition AV Class utilizing a DLNA Transport Packet with zero value timestamp	video/vnd.dlna.mpeg-tts	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems with extensions for Korea. It is supported by DTVs, STBs, and PCs with DTV tuner cards.

Profile ID	Description	MIME type	Label	Usage scenarios
MPEG_TS_HD_KO_T	Korea region profile for High Definition AV Class utilizing a DLNA Transport Packet with a valid non-zero timestamp	video/vnd.dlna.mpeg-tts	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems with extensions for Korea. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_HD_KO_ISO	Korea region profile for High Definition AV Class utilizing a DLNA Transport Packet without a Timestamp field	video/mpeg	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to ATSC (terrestrial) and SCTE (cable) systems with extensions for Korea. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_EU	European region profile for Standard Definition AV Class utilizing a DLNA Transport Packet with zero value timestamp	video/vnd.dlna.mpeg-tts	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_EU_T	European region profile for Standard Definition AV Class utilizing a DLNA Transport Packet with a valid non-zero timestamp	video/vnd.dlna.mpeg-tts	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_EU_ISO	European region profile for Standard Definition AV Class utilizing a DLNA Transport Packet without a Timestamp field	Video/mpeg	SD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_SD_EU_DTS_ISO	MPEG-2 video, wrapped in MPEG-2 Transport Stream with DTS audio, without a timestamp field	video/mpeg	SD	A profile used for digital television broadcasting, and for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_JP_T	MPEG-2 Main Profile at Main, High-1 440 and High Level with MPEG-2 AAC encapsulated in MPEG-2 TS with valid timestamp	video/vnd.dlna.mpeg-tts	HD	A profile utilized to create recordings of Japanese Broadcast TV. This profile is supported by PCs, TVs and STBs.
MPEG_TS_SD_DTS_ISO	MPEG-2 video, wrapped in MPEG-2 Transport Stream, with DTS audio, without a timestamp field	video/mpeg	SD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.

Profile ID	Description	MIME type	Label	Usage scenarios
MPEG_TS_HD_DTS_ISO	MPEG-2 video, wrapped in MPEG-2 Transport Stream with DTS audio, without a timestamp field	video/mpeg	HD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
MPEG_TS_HD_DTS_T	MPEG-2 Video, wrapped in MPEG-2 Transport Stream, with DTS Digital Surround Audio, with a valid non-zero timestamp field	video/vnd.dlna.mpeg-tts	HD	A profile for creating AV content. This profile is supported by Personal AV Players, PCs, and all devices in the home-entertainment ecosystem.
MPEG_TS_HD_DTS_HD_T	MPEG-2 Video, wrapped in MPEG-2 Transport Stream, with DTS-HD Audio, with a valid non-zero timestamp field.	video/vnd.dlna.mpeg-tts	HD	A profile for creating AV content. This profile is supported by Personal AV Players, PCs, and all devices in the home-entertainment ecosystem.
MPEG_DIRECTV_S_D_MPEG1_L2	MPEG-2 video wrapped in ITU-R Rec BO.1516 system B Transport Stream with MPEG-1 L2 audio, without a timestamp field	video/vnd.directv.mpeg	SD	A profile used in North and South America for Direct Broadcast Satellite distribution and home networking of A/V content. This profile is supported by STBs, Home Media Centers, Home Media Center clients and Digital Video Recorders.
MPEG_DIRECTV_S_D_MPEG1_L2_T	MPEG-2 video wrapped in ITU BO 1516 system B Transport Stream with MPEG-1 L2 audio, with a valid non-zero timestamp field	video/vnd.directv.mpeg-tts	SD	A profile used in North and South America for Direct Broadcast Satellite distribution and home networking of A/V content. This profile is supported by STBs, Home Media Centers, Home Media Center clients and Digital Video Recorders.

5.17 AV Class: MPEG-4 Part 10 (AVC) profiles

Table 16 describes the MPEG-4 Part 10 profiles of the DLNA AV Class.

Table 16 – AV Class: MPEG-4 Part 10 (AVC) profiles

Profile ID	Description	MIME type	Label	Usage scenarios
AVC_TS_NA_T	AVC video wrapped in MPEG-2 Transport Stream, as constrained by SCTE standards, with AC-3, Enhanced AC-3, MPEG-4 HE-AAC v2 or MPEG-1 Layer II audio, with a valid non-zero timestamp field.	video/vnd.dlna.mpeg-tts	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to SCTE (cable), satellite and IPTV systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_NA_ISO	AVC video wrapped in MPEG-2 Transport Stream, as constrained by SCTE standards, with AC-3, Enhanced AC-3, MPEG-4 HE-AAC v2 or MPEG-1 Layer II audio, without a timestamp field.	video/mpeg	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to SCTE (cable), satellite and IPTV systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_NA_3DFC_ISO	AVC high profile, HD 3D frame-compatible video wrapped in MPEG-2 Transport Stream with AC-3, Enhanced AC-3 or HE AAC audio, without a Timestamp field	video/mpeg	HD	A profile derived from digital television broadcasting, and also used for storing digital video streams. This profile applies to SCTE (cable), satellite and IPTV systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_EU_ISO	AVC video wrapped in MPEG-2 TS Transport Stream as constrained by DVB standards, with AC-3, Enhanced AC-3 and MPEG-4 HE-AAC v2 audio.	video/mpeg	HD	A profile used for Terrestrial, Satellite and IPTV Broadcast Distribution in Europe.
AVC_TS_EU_3DFC_ISO	AVC high profile, 3DFC video wrapped in MPEG-2 Transport Stream with no timestamp field	video/mpeg	3DFC	This profile supports HD 3DFC broadcast content that conforms to the DVB specification. 3DTV-compliant display devices such as TVs, STBs, and integrated digital TVs support this profile.
AVC_TS_SD_EU_DTS_ISO	European region profile for SD resolution. AVC video wrapped in MPEG-2 Transport Stream with DTS audio, without a timestamp field.	Video/mpeg	SD	A profile used for digital television broadcasting, and for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.

Profile ID	Description	MIME type	Label	Usage scenarios
AVC_TS_HD_EU_DTS_ISO	European region profile for HD/SD resolution. AVC video wrapped in MPEG-2 Transport Stream with DTS audio, without a timestamp field.	video/mpeg	HD	A profile used for digital television broadcasting, and for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_SHP_HD_EU_AC3_T	European region profile for HD/SD resolution. AVC video using the Scalable High Profile (SVC) wrapped in MPEG-2 Transport Stream with AC-3 audio, with a valid non-zero timestamp field.	video/vnd.dlna.mpeg-tts		A profile used for digital television broadcasting, and for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_SHP_HD_EU_HEAACv2_L4_T	European region profile for HD/SD resolution. AVC video using the Scalable High Profile (SVC) wrapped in MPEG-2 Transport Stream with MPEG-4 HE-AAC v2 Level 4 audio, with a valid non-zero timestamp field.	video/vnd.dlna.mpeg-tts	HD SD	A profile used for digital television broadcasting, and for storing digital video streams. This profile applies to DVB (terrestrial, cable, and satellite) systems. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_MP_SD_DTS_ISO	AVC video wrapped in MPEG-2 Transport Stream with DTS audio without timestamp field.	video/mpeg	SD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_MP_SD_DTSHD_ISO	AVC video wrapped in MPEG-2 Transport Stream with DTS-HD audio without timestamp field.	video/mpeg	SD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_HP_HD_DTS_ISO	AVC video wrapped in MPEG-2 Transport Stream with DTS audio, without a timestamp field.	video/mpeg	HD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_HP_HD_DTSHD_ISO	AVC video wrapped in MPEG-2 Transport Stream with DTS-HD audio, without a timestamp field.	video/mpeg	HD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_TS_HP_HD_L41_DTS_ISO	AVC video wrapped in MPEG-2 Transport Stream with DTS audio, without a timestamp field.	video/mpeg	HD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.

Profile ID	Description	MIME type	Label	Usage scenarios
AVC_TS_HD_DTS_T	AVC Video, wrapped in MPEG-2 Transport Stream, with DTS Audio, with a valid non-zero timestamp field.	video/vnd.dlna.mpeg-tts	HD	A profile for creating AV content. This profile is supported by Personal AV Players, PCs, and all devices in the home-entertainment eco-system.
AVC_TS_HD_DTS_HD_T	AVC Video, wrapped in MPEG-2 Transport Stream, with DTS-HD Audio, with a valid non-zero timestamp field.	video/vnd.dlna.mpeg-tts	HD	A profile for creating AV content. This profile is supported by Personal AV Players, PCs, and all devices in the home-entertainment eco-system.
AVC_TS_HD_3D_AC3_ISO	Profile for HD 3D resolution. AVC using the Stereo High Profile (MVC) wrapped in MPEG-2 Transport Stream, with AC-3 audio, without a timestamp field	video/mpeg	3D	A profile used for storing digital video streams. It is supported by STBs, and PCs with BD players.
AVC_TS_HD_3D_DTSHD_ISO	Profile for HD 3D resolution. AVC using the Stereo High Profile (MVC) with DTS or DTS-HD audio, wrapped in MPEG-2 Transport Stream without a timestamp field,	video/mpeg	3D	A profile used for storing digital video streams. It is supported by STBs, and PCs with BD players.
AVC_MP4_EU	AVC video with MPEG-4 HE-AAC v2 and Enhanced AC-3 audio, encapsulated in MP4.	video/mp4	HD	A profile used for Storage of Terrestrial, Satellite and IPTV Recording in Europe.
AVC_MP4_BL_CIF15_AAC_520	AVC wrapped in MP4 baseline profile CIF15 with AAC LC audio.	video/mp4	CIF15	This profile is used for Broadcast services, Mobile services (for example 3GPP services), and Commercial A/V content services and to create recordings of Personal Content with a Mobile Recording Device. This profile is supported by all devices in the MHD category that implement the AV Media Class.
AVC_MP4_MP_SD	AVC Main Profile SD video with MPEG-4 AAC audio, encapsulated in MP4	video/mp4	SD	This profile is used for IP-delivered content services, Mobile content services, and Commercial A/V content services, and to create recordings of Personal Content. This profile is supported by all devices in the HND and MHD categories that implement the A/V Media Class.

Profile ID	Description	MIME type	Label	Usage scenarios
AVC_MP4_HP_HD	AVC High Profile HD video with MPEG-4 AAC audio, encapsulated in MP4	video/mp4	HD	This profile is used for IP-delivered content services, Mobile content services, and Commercial A/V content services, and to create recordings of Personal Content. This profile is supported by all devices in the HND and MHD categories that implement the A/V Media Class and can support HD video decoding.
AVC_MP4_BL_DTS	AVC Baseline Profile video with DTS audio, encapsulated in MP4.	video/mp4	CIF30	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_MP4_BL_DTSHD	AVC Baseline Profile video with DTS-HD audio, encapsulated in MP4.	video/mp4	CIF30	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_MP4_MP_SD_DTS	AVC Main Profile video with DTS audio, encapsulated in MP4.	video/mp4	SD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_MP4_MP_SD_DTSHD	AVC Main Profile video with DTS-HD audio, encapsulated in MP4.	video/mp4	SD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_MP4_HP_HD_DTS	AVC High Profile video with DTS audio, encapsulated in MP4.	video/mp4	HD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_MP4_HP_HD_DTSHD	AVC High Profile video with DTS-HD audio, encapsulated in MP4.	video/mp4	HD	A profile used for digital television broadcasting, and for storing digital video streams. It is supported by DTVs, STBs, and PCs with DTV tuner cards.
AVC_MP4_MP_SD_EAC3	AVC Main Profile video with Enhanced AC-3 audio, encapsulated in MP4.	video/mp4	SD	A profile used for online content delivery and for storing online content.
AVC_MP4_HP_HD_EAC3	AVC High Profile video with Enhanced AC-3 audio, encapsulated in MP4.	video/mp4	HD	A profile used for online content delivery and for storing online content.
AVC_MP4_HP_HD_MLP	AVC High Profile HD with MLP audio, encapsulated in MP4	video/mp4	HD	This profile is used for online content delivery
AVC_MP4_HD_HE AACv2_L6	AVC high profile video with HE AAC v2 stereo or HE AAC 7.1-channel audio, encapsulated in an MP4 file	video/mp4	HD	This profile is used for IP-delivered content services, Mobile content services, and Commercial A/V content services, and to create recordings of Personal Content.

Profile ID	Description	MIME type	Label	Usage scenarios
AVC_CFF_SD	AVC Constrained Baseline Profile with AAC audio and optional enhanced audio, encapsulated in MP4 conforming to the additional DECE CFF requirements including encryption and constrained to the DECE SD profile requirements.	video/vnd.dece.mp4 sdv1 0 or video/vnd.dece.mp4 sdv1 1	SD	This profile is used for online delivery of content. The content may be encrypted.
AVC_CFF_HD	AVC High Profile HD with AAC audio and optional enhanced audio, encapsulated in MP4 conforming to the additional DECE CFF requirements including encryption and constrained to the DECE HD profile requirements.	video/vnd.dece.mp4 hdv1 0 or video/vnd.dece.mp4 hdv1 1	HD	This profile is used for online delivery of content. The content may be encrypted.
AVC_MKV_MP_HD_AAC_MULT5	AVC Main Profile video with MPEG-4 AAC audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_MP_HD_HEAAC_L4	AVC Main Profile video with MPEG-4 HE-AAC audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_MP_HD_AC3	AVC Main Profile video with AC-3 audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_MP_HD_MPEG1_L3	AVC Main Profile video with MP3 audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_HP_HD_AAC_MULT5	AVC High Profile video with MPEG-4 AAC audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_HP_HD_HEAAC_L4	AVC High Profile video with MPEG-4 HE-AAC audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.

Profile ID	Description	MIME type	Label	Usage scenarios
AVC_MKV_HP_HD_AC3	AVC High Profile video with AC-3 audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_HP_HD_MPEG1_L3	AVC High Profile video with MP3 audio, encapsulated in MKV.	video/x-matroska	HD	This profile is used for HDTV content delivery, recordings thereof and Personal Content. This profile is supported by TVs, Home Theatre Systems, and PCs.
AVC_MKV_MP_HD_DTS	AVC video and DTS audio in MKV container	video/x-matroska	HD	This profile is used for online delivery of content.
AVC_MKV_MP_HD_DTSE	AVC video and DTS Express audio in MKV container	video/x-matroska	HD	This profile is used for online delivery of content.
AVC_MKV_MP_HD_DTSL	AVC video and DTS Coreless Lossless audio in MKV container	video/x-matroska	HD	This profile is used for online delivery of content.
AVC_MKV_MP_HD_EAC3	AVC Main Profile HD with Enhanced AC-3 audio, encapsulated in MKV	video/x-matroska	HD	This profile is used for online content delivery
AVC_MKV_HP_HD_DTS	AVC video and DTS audio in MKV container	video/x-matroska	HD	This profile is used for online delivery of content.
AVC_MKV_HP_HD_DTSE	AVC video and DTS Express audio in MKV container	video/x-matroska	HD	This profile is used for online delivery of content.
AVC_MKV_HP_HD_DTSL	AVC video and DTS Coreless Lossless audio in MKV container	video/x-matroska	HD	This profile is used for online delivery of content.
AVC_MKV_HP_HD_EAC3	AVC High Profile HD with Enhanced AC-3 audio, encapsulated in MKV	video/x-matroska	HD	This profile is used for online content delivery
AVC_MKV_HP_HD_MLP	AVC High Profile HD with MLP audio, encapsulated in MKV	video/x-matroska	HD	This profile is used for online content delivery
DASH_AVC_TS_SD_ISO	AVC SD video wrapped in MPEG-2 Transport Stream, as constrained by SCTE standards, with AAC audio and optional enhanced audio, without a timestamp field and constrained to an SD video profile.	video/mp2t	SD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH MPEG-2 TS Simple profile. The content may be encrypted.

Profile ID	Description	MIME type	Label	Usage scenarios
DASH_AVC_TS_HD_ISO	AVC HD video wrapped in MPEG-2 Transport Stream, as constrained by SCTE standards, with AAC audio and optional enhanced audio, without a timestamp field and constrained to an HD video profile.	video/mp2t	HD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH MPEG-2 TS Simple profile. The content may be encrypted.
DASH_AVC_MP4_SD	AVC Main Profile SD video with AAC audio and optional enhanced audio, encapsulated in MP4 conforming to the additional DECE CFF requirements including encryption and constrained to the DECE SD profile requirements.	video/mp4	SD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH ISO profiles. The content may be encrypted.
DASH_AVC_MP4_HD	AVC High Profile HD video with AAC audio and optional enhanced audio, encapsulated in MP4 conforming to the additional DECE CFF requirements including encryption and constrained to the DECE HD profile requirements.	video/mp4	HD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH ISO On Demand or live profiles. The content may be encrypted.
DASH_AVC_MP4_SD_HEAACv2_L4	AVC Main Profile video with HE AACv2 L4 audio, encapsulated in MP4.	video/mp4	SD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH ISO On Demand or live profiles.
DASH_AVC_MP4_HD_HEAACv2_L4	AVC High Profile HD video with HE AACv2 L4 audio, encapsulated in MP4.	video/mp4	HD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH ISO On Demand or live profiles.
DASH_AVC_MP4_HD_HEAACv2_L6	AVC high profile video with HE AAC v2 stereo or HE AAC 7.1-channel audio, encapsulated in an MP4 file suitable for MPEG DASH conformant adaptive delivery	video/mp4	HD	This profile is used for delivery of adaptive online content that conforms to the MPEG DASH ISO On Demand or live profiles.

5.18 AV Class: MPEG-H Part 2 (HEVC) profiles

Table 17 describes the MPEG-H Part 2 (HEVC) profiles of the DLNA AV Class.

Table 17 – AV Class: MPEG-H Part 2 (HEVC) profiles

Profile ID	Description	MIME Type	Label	Usage Scenarios
DASH_HEVC_MP4_UHD_NA	HEVC High Profile HD and UHD video with AC-3, Enhanced AC-3, HE-AACv2 or MPEG-1 LII audio, encapsulated in MP4.	video/mp4	UHD	This profile is used for delivery of UHDTV adaptive online content that conforms to the MPEG DASH ISO On Demand or Live profiles. The content may be encrypted.

5.19 AV Class: VC-1 profiles

Table 18 describes the VC-1 profiles of the DLNA AV Class.

Table 18 – AV Class: VC-1 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
VC1_ASF_AP_L1_WMA	VC-1 video with WMA audio, encapsulated in ASF.	video/x-ms-asf	SD	A profile used in the context of linear and on-demand distribution of Digital TV streams.
VC1_ASF_AP_L2_WMA	VC-1 video with WMA audio, encapsulated in ASF.	video/x-ms-asf	HD	A profile used in the context of linear and on-demand distribution of Digital TV streams.

5.20 AV Class: WMV9 profiles

Table 19 describes the WMV9 profiles of the DLNA AV Class.

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Table 19 – AV Class: WMV9 profiles

Profile ID	Description	MIME type	Label	Usage scenarios
WMVMED_BASE	Medium resolution video (Main Profile at Medium Level) with baseline WMA audio.	video/x-ms-wmv	SD	A profile used for IP and Web-based video distribution of content. This profile is supported by Personal Video Players and PCs.
WMVMED_FULL	Medium resolution video (Main Profile at Medium Level) with full WMA audio.	video/x-ms-wmv	SD	A profile used for IP and Web-based video distribution of content. This profile is supported by Personal Video Players and PCs.
WMVMED_PRO	Medium resolution video (Main Profile at Medium Level) with WMA professional audio.	video/x-ms-wmv	SD	A profile used for IP and Web-based video distribution of content. This profile is supported by Personal Video Players and PCs.
WMVHIGH_FULL	High resolution video (Main Profile at High Level) with full WMA audio.	video/x-ms-wmv	HD	A profile used for IP and Web-based video distribution of content. This profile is supported by Personal Video Players and PCs.
WMVHIGH_PRO	High resolution video (Main Profile at High Level) with WMA professional audio.	video/x-ms-wmv	HD	A profile used for IP and Web-based video distribution of content. This profile is supported by Personal Video Players and PCs.

5.21 Media collection profiles

Table 20 describes the Media collection profiles.

Table 20 – Media collection profiles

Profile ID	Description	MIME type	Label	Usage scenarios
DIDL_S	Profile derived from DIDL-Lite to be used for describing media collections.	text/xml	N/A	A profile used for exchanging information on a collection of media items. This profile can be supported by home networked devices.
DIDL_V	Profile derived from DIDL-Lite to be used for describing media collections.	text/xml	N/A	A profile used for exchanging information on a collection of media items. This profile can be supported by home networked devices.

6 Media Format interoperability model

6.1 Media interoperability guidelines

6.1.1 General

In order to provide a media interoperability model between various types of DLNA devices, DLNA Media Format Profiles are classified into Mandatory and Optional. Media Format Profiles are Mandatory or Optional for a given Device Category. Subclause 6.1 defines conditions for overall interoperability, and 6.2 defines the specific set of Media Format Profiles that comprise the Mandatory Media Format Profiles. Servers shall be capable of exposing and transferring Mandatory Media Format Profiles while players and renderers shall be capable of decoding and rendering the Mandatory Media Format Profiles. Unfortunately, Mandatory Media Format

Profiles cannot be defined universally to suit all scenarios. For this reason, the definition of Mandatory Media Format Profiles has to be made taking into account the geographical region and the target Device Category. Subclause 6.1.2 provides the definitions and requirements for using Mandatory Media Format Profiles.

All profiles not defined as mandatory become optional in the home. An implementer can choose whether to support optional profiles. When supported and used with DLNA's discovery and transfer methods, it shall follow the guideline provisions for encoding and exposing optional profiles.

Within one of the DLNA Device Categories, a Content Receiver that supports a given Media Class has to support all Mandatory Media Format Profiles for that Media Class in the corresponding Device Category as defined in subsequent guidelines. However, such a device could implement additional partial profiling of another Media Class. Such a partial profiling can include just a subset of Mandatory Media Format profiles or just a subset of Profile Parameter Sets. Such a device would not be able to claim support for that additional Media Class. For example, a DLNA Rendering Endpoint in the HND category that supports an Audio Media Class has to implement all mandatory guidelines for LPCM, but could also provide support for rendering video profiled by an Optional AV Media Class Media Format Profile (for example, MPEG_TS_SD_EU – profiled video).

Each Media Format Profile is described using a "Profile ID" text token. As described in guideline 10.1.3.18 (GUN T43WJ) in IEC 62481-1-1:2017, this text token is always exposed as one of the parameters associated with any content resource in the network. The Profile ID uniquely identifies the characteristics of a Media Format Profile. Future versions of the guidelines will add new Profile IDs but will preserve the uniqueness. Consequently, devices built to comply with a certain version of the DLNA guidelines could, if so desired, include support for Media Format Profiles defined in subsequent guideline versions and addendums.

6.1.2 MF Mandatory Media Format Profiles: support guidelines

6.1.2.1

[GUIDELINE] Rendering Endpoints of a DLNA Device Category that claim to support a particular DLNA Media Class shall be capable of decoding and rendering all Mandatory Media Format Profiles for that Media Class and that DLNA Device Category.

[ATTRIBUTES]

M	C	DMP DMR	M-DMP	n/a	ISO/IEC 13818-7	V86M9
---	---	---------	-------	-----	--------------------	-------

[COMMENT] Examples of when this is not required:

a Rendering Endpoint designed to support only the DLNA Audio Media Class for the Device Category of Home Network Devices (HND) is not required to support AV Media Class Mandatory Media Format Profiles;

the same Rendering Endpoint is not required to support Audio Media Class Mandatory Media Format Profiles for a different Device Category.

6.1.2.2

[GUIDELINE] Serving Endpoints of a DLNA Device Category that claim to support a particular DLNA Media Class shall be capable of exposing at least one of the Mandatory Media Format Profiles for that Media Class and that DLNA Device Category.

[ATTRIBUTES]

M	C	DMS	M-DMS	n/a	ISO/IEC 13818-7	VEJX7	
---	---	-----	-------	-----	--------------------	-------	--

[COMMENT] A Serving Endpoint that cannot expose content in any Mandatory Media Format Profile for its corresponding Device Category is not compliant with this guideline.

Examples of compliant Serving Endpoint implementations include the following.

A Serving Endpoint implementation on a PC belonging to the HND category that allows the user or application acting on the user's behalf to provide content in at least one of the Mandatory Media Format Profiles for the Media Classes the Serving Endpoint implementation claims to support in the HND category. The content can be exposed and transferred by the Serving Endpoint implementation to other DLNA devices.

A Serving Endpoint device that allows the encoding of content to be user selectable in at least one of the Mandatory Media Format Profiles of the corresponding Device Category for the DLNA Media Classes it claims to support. A Digital Video Recorder might by default support MPEG-4 encoding of captured video content, but either convert it to an AV Media Class Mandatory Media Format Profile for on-demand streaming to DLNA devices or else allow the user to change the content capture encoding to an AV Media Class Mandatory Media Format Profile. Such a device would also be compliant if the user can insert a memory card into it with content in a Mandatory Media Format Profile and the device then is able to expose and transfer it to other DLNA devices.

A Serving Endpoint which is not capable of storing files in a Mandatory Media Format Profile of its Device Category, but which can provide a transcoded version of some items originally stored in an optional profile, when the transcoded version is in the Mandatory Media Profile for its Device Category.

6.1.3 MF Optional Media Formats: support guidelines

[GUIDELINE] Serving Endpoints and Rendering Endpoints that claim to support a particular DLNA Media Class may support any of the optional DLNA Media Format Profiles for that DLNA Device Category and for that Media Class.

[ATTRIBUTES]

O	C	DMS DMP DMR	M-DMS M-DMP	n/a	ISO/IEC 13818-7	L6LR8	A
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6.1.4 MF Optional Media Formats: content availability

[GUIDELINE] If a Serving Endpoint exposes a content item encoded to an optional DLNA Media Format Profile of the Serving Endpoint's Device Category in a CDS with the DLNA.ORG_PN parameter in res@protocolInfo, then the Serving Endpoint should also expose this content in a Mandatory Media Format Profile for the relevant Media Class of the Serving Endpoint's Device Category. All content available on Serving Endpoints should be exposed in a Mandatory Media Format Profile of each of the Serving Endpoint's Device Categories regardless of its native format.

[ATTRIBUTES]

S	C	DMS	M-DMS	n/a	IEC 62481-1-1: 2017	86M9R	
---	---	-----	-------	-----	------------------------	-------	--

[COMMENT] Since Rendering Endpoints such as a DMP are required to support content in Mandatory Media Format Profiles, this guideline recommends that all content available in

Optional Media Format Profiles on Serving Endpoints also be made available and exposed in a Mandatory Media Format Profile. If a device implements both a DMS and M-DMS, this guideline recommends that all content available in optional DLNA Media Format Profiles on such a device also be made available and exposed in the Mandatory Media Format Profiles for the two different Device Categories (HND and MHD). This can be achieved by a variety of means including storing copies of a content item in different formats or by conversion on demand for a content item.

6.1.5 MF Optional Media Formats: user indications

6.1.5.1

[GUIDELINE] For any content item in an optional DLNA Media Format Profile, an indication should be given to the user of the following condition at the time content items are exposed to the user for selection:

if the selected Rendering Endpoint is not capable of rendering the content item.

The form of this user indication is implementation dependent and can be user selectable.

[ATTRIBUTES]

S	C	DMP DMC +PU+	M-DMP M-DMC	n/a	ISO/IEC 13818-7	JX7J8
---	---	--------------	-------------	-----	--------------------	-------

[COMMENT]

- a) Optional media profiles are defined for each DLNA Device Category. Examples of implementations that comply with this guideline include:
 - Not displaying a content item that meets the condition to the user.
 - Graying out a content item that meets the condition and preventing its selection for playback by the user.
- b) User selectable means that an implementation can allow users to turn this indication feature on or off, or to select among multiple indication alternatives. The actual methods for providing these options to users and the default values for these options are implementation dependent.
- c) In the 3-box system usage, the DMC and M-MDC provide an indication of the DMR's capabilities. In the 2-box Pull and Download System usages, the DMP and M-DMP provide an indication of their capabilities respectively.

6.1.5.2

[GUIDELINE] For any content item in a DLNA Media Format Profile an indication should be given to the user of the following condition at the time content items are exposed to the user for selection:

if the content item is not available in a mandatory format for the Device Category of the selected renderer.

The form of this user indication is implementation dependent and can be user selectable.

[ATTRIBUTES]

S	C	DMP DMC +PU+	M-DMP M-DMC	n/a	ISO/IEC 13818-7	6M9RD
---	---	--------------	-------------	-----	--------------------	-------

[COMMENT]

- a) Examples of implementations that comply with this guideline include:
 - Not displaying a content item that meets the condition to the user.
 - A textual statement for the user indicating a content item that meets the condition is not available in a Mandatory Media Format Profile of the corresponding DLNA Device Category.
 - A visual mark for the user such as a '-' or '*' displayed alongside a content item that meets the condition and explanatory text elsewhere (e.g. a product manual or help file).
- b) User selectable means that an implementation can allow users to turn this indication feature on or off, or to select among multiple indication alternatives. The actual methods for providing these options to users and the default values for these options are implementation dependent.

6.1.6 MF Media Format overlap

6.1.6.1

[GUIDELINE] If a content binary is conformant to a Mandatory Media Format Profile of any Device Category, Serving Endpoints shall expose the content binary in this Mandatory Media Format Profile.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	n/a	EJX7J	C
---	---	-----	-------	-----	-----	-------	---

[COMMENT] Serving Endpoints can provide multiple <res> elements with different Media Format Profile IDs. If the guidelines in 6.1.6 result in two or more separate Media Format Profile IDs being recommended, each can be exposed as a separate <res> element.

6.1.6.2

[GUIDELINE] If a content binary is conformant to multiple DLNA Media Format Profiles, Serving Endpoints should expose the content binary in one or more of the Media Format Profiles to provide a high level of interoperability.

A high level of interoperability can be achieved, for example, by choosing a profile with the most restrictive parameter set range(s), or by choosing to expose the content using all of the profiles to which the content binary conforms using multiple <res> elements.

[ATTRIBUTES]

S	A	DMS	M-DMS	n/a	n/a	IFTQR	
---	---	-----	-------	-----	-----	-------	--

6.1.7 MF Profile Parameter Sets

6.1.7.1

[GUIDELINE] Serving Endpoints that expose content identified with a particular Profile ID shall use one of the permitted Profile Parameter Sets of such a Profile ID.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	n/a	6LR87	A
---	---	-----	-------	-----	-----	-------	---

[COMMENT] Each Profile ID is composed of parameters like bitrate, sampling rate, resolution, etc. Each parameter admits one or more options recognized sometimes by textual description and at other times by the use of a list of options identified by the "➤" entry symbol. For example, a guideline entry may have sampling rates defines as follows:

- 44,1 kHz;
- 48 kHz.

In this example, these two values define two different sampling rate parameter values.

This guideline states that for each parameter that has a list of options, a Serving Endpoint shall support at least one of the listed values.

6.1.7.2

[GUIDELINE] Rendering Endpoints that claim to decode content identified with a particular Profile ID shall be capable of rendering any of the defined Profile Parameter Sets of such a Profile ID.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	WFSJT	A
---	---	---------	-------	-----	-----	-------	---

[COMMENT] Rendering Endpoints can choose to render optional parameters. Since Rendering requires producing an output for all parameter sets of a profile, this implies that the Rendering Endpoint tolerate parameters defined for the profile.

6.1.7.3

[GUIDELINE] If a Serving Endpoint exposes content identified with a Profile ID that has a permitted Profile Parameter Set with parameters whose values are used in the MIME type, then it shall indicate which parameter values it supports by using multiple listings (one for each of the parameter values supported) of the Profile ID published in the CMS.SourceProtocolInfo instance state variable.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	n/a	LDXV2	A
---	---	-----	-------	-----	-----	-------	---

[COMMENT] Some Profile IDs have parameters such as sampling rate, number of channels or interchange format which shall be included in the MIME type exposed by the Serving Endpoint. For example, the HND Audio Media Class Mandatory Media Format Profile, LPCM, may have four different MIME type listings depending on the parameter values supported (see requirement 8.5.3.2):

```
audio/L16;channels=1;rate=44100;
audio/L16;channels=2;rate=44100;
audio/L16;channels=1;rate=48000;
audio/L16;channels=2;rate=48000.
```

Another example is the MHD Audio Media Class Mandatory Media Format Profile, AAC_ISO_320, which may have two different MIME type listings depending on the audio interchange format it supports (see requirement 8.9.47.2):

```
audio/mp4;
audio/3gpp.
```

In each case, the supported parameter values need to be explicitly listed in the CMS.SourceProtocolInfo instance state variable of the Serving Endpoint. For example, if the Serving Endpoint only has support for mono and stereo LPCM at a sampling rate for 44,1 kHz, then it lists only these two entries:

http-get:*: audio/L16;channels=1;rate=44100:DLNA.ORG_PN=LPCM;

http-get:*: audio/L16;channels=2;rate=44100:DLNA.ORG_PN=LPCM.

Similarly, if it supports AAC_ISO_320 only using the MP4 audio interchange format it lists only:

http-get:*: audio/mp4:DLNA.ORG_PN=AAC_ISO_320.

This guideline is aimed at facilitating interoperability for the Upload system usage

6.1.8 MF audio rendering guidelines

[GUIDELINE] Rendering Endpoints that support DLNA Media Format Profiles with multichannel, stereo, or mono audio parameter sets shall be capable of rendering the audio bitstream by outputting all of the channels or converting all multichannel, stereo, or mono information into an implementation-dependent single-channel audio output at a minimum.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	6WFSJ	A
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6.2 Mandatory and Optional Media Format Profile guidelines

6.2.1 MF Mandatory Image Class Media Format Profile for HND and MHD Device Categories

[GUIDELINE] The Mandatory Media Format Profile applicable to the DLNA HND and MHD Device Categories for the Image Media Class is:

JPEG_SM

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	69K5T	
---	---	---------	---------	-----	-----	-------	--

6.2.2 MF Optional Image Class Media Format Profile for HND and MHD Device Categories

[GUIDELINE] All image Media Format Profiles other than the one listed in 6.2.1 are optional image Media Format Profiles for DLNA HND and MHD devices as defined in IEC 62481-1-1:2017, Clause 5.

[ATTRIBUTES]

O	A	All HND	All MHD	n/a	n/a	9K5TB	
---	---	---------	---------	-----	-----	-------	--

6.2.3 MF Mandatory Audio Class Media Format Profile for the HND and MHD Device Categories

[GUIDELINE] The Mandatory Media Format Profile applicable to the DLNA HND and MHD Device Categories for the Audio Media Class is:

LPCM;

AAC_ISO_320;
MP3.

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	Q77AY	C
---	---	---------	---------	-----	-----	-------	---

6.2.4 MF Optional Audio Class Media Format Profile for the HND and MHD Device Categories

[GUIDELINE] All audio Media Format Profiles other than the one listed in 6.2.3 are optional audio Media Format Profile profiles for DLNA HND and MHD devices. These profiles are defined in Clause 8.

[ATTRIBUTES]

O	A	All HND	All MHD	n/a	n/a	LQ77A	C
---	---	---------	---------	-----	-----	-------	---

6.2.5 MF Mandatory AV Class Media Format Profiles for the HND and MHD Device Categories

6.2.5.1

[GENERAL] Clause 6.2.5 defines the Mandatory Media Format Profiles for the HND and MHD Device Categories for the AV Media Class. Unless explicitly clarified (prefixed) by SD, HD, UHD or Regional, the term Mandatory Media Format Profiles (when applied to the AV Media Class) refers to all the profiles defined in Clause 6.2.5.

Guidelines 6.1.2.1 and 6.1.2.2 define the mandatory requirements to support these profiles on a Device Class basis.

6.2.5.2

[GUIDELINE] The SD Mandatory Media Format Profiles applicable to the HND and MHD Device Categories for the AV Media Class shall be as follows:

AVC_MP4_MP_SD.

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	QOSMM	C
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6.2.5.3

[GUIDELINE] The Regional Mandatory SD Media Format Profile applicable to the DLNA HND and MHD Device Categories for the AV Media Class shall be those defined in Table 21:

Table 21 – Regional Mandatory SD Media Format Profiles for the HND and MHD Device Categories

Japan	US	Korea	EU
MPEG_PS_NTSC	MPEG_PS_NTSC	MPEG_PS_NTSC	MPEG_PS_PAL
MPEG_TS_JP_T	MPEG_TS_SD_NA	MPEG_TS_SD_KO	MPEG_TS_SD_EU
	MPEG_TS_SD_NA_T	MPEG_TS_SD_KO_T	MPEG_TS_SD_EU_T
	MPEG_TS_SD_NA_ISO	MPEG_TS_SD_KO_ISO	MPEG_TS_SD_EU_ISO

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	OMCJY	N
---	---	---------	---------	-----	-----	-------	---

[COMMENT] Table 21 defines the Mandatory SD Media Format Profiles for the HND and MHD Device Categories according to the geographical region. Note that the MPEG_TS_JP_T profile is included in Table 21 as this profile supports SD resolutions in addition to HD resolutions.

6.2.5.4

[GUIDELINE] The HD Mandatory Media Format Profile applicable to the DLNA HND and MHD Device Category for the AV Media Class shall be as follows:

AVC_MP4_HP_HD.

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	FHMVO	N
---	---	---------	---------	-----	-----	-------	---

6.2.5.5

[GUIDELINE] The Regional Mandatory HD Media Format Profile applicable to the DLNA HND and MHD Device Categories for the AV Media Class shall be those defined in Table 22.

Table 22 – Regional Mandatory HD Media Format Profiles for the HND and MHD Device Categories

Japan	US	Korea	EU
MPEG_TS_JP_T	N/A	N/A	N/A

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	ZV5D5	N
---	---	---------	---------	-----	-----	-------	---

[COMMENT] Table 22 defines the Mandatory HD Media Format Profiles for the HND and MHD Device Categories according to geographical region.

6.2.5.6

[GUIDELINE] The Regional Mandatory UHD Media Format Profile applicable to the DLNA HND and MHD Device Categories for the AV Media Class shall be those defined in Table 23.

Table 23 – Regional Mandatory UHD Media Format Profiles for the HND and MHD Device Categories

Japan	US	Korea	EU
N/A	DASH_HEVC_MP4_UHD_NA	N/A	N/A

[ATTRIBUTES]

M	A	All HND	All MHD	n/a	n/a	E6DI6	N
---	---	---------	---------	-----	-----	-------	---

[COMMENT] Table 23 defines the Mandatory UHD Media Format Profiles for the HND and MHD Device Categories according to the geographical region.

6.2.6 MF Optional AV Class Media Format Profiles for the HND and MHD Device Device Categories

[GUIDELINE] All AV Media Format Profiles other than the ones required by 6.2.5 are optional AV Media Format Profiles for DLNA HND and MHD devices. These profiles are defined in Clause 5 and in Clause 7 of this document.

[ATTRIBUTES]

O	A	All HND	All MHD	n/a	n/a	AO6AX	C
---	---	---------	---------	-----	-----	-------	---

6.2.7 MF Optional Media Collection Profile for the HND and MHD Device Categories**6.2.7.1****[PROFILES]**

DIDL_S, DIDL_V

6.2.7.2

[GUIDELINE] The optional Media Collection Profile ID values applicable to the DLNA HND and MHD Device Categories are:

DIDL_S;

DIDL_V.

Serving Endpoints of any Device Category may be capable of exposing and transferring items identified with these Profile ID values.

Uploading Endpoint devices of any Device Category may be capable of transferring items identified with these Profile ID values.

Rendering Endpoints of any Device Category may be capable of decoding and processing items identified with these Profile ID values.

[ATTRIBUTES]

O	A	All HND	All MHD	n/a	n/a	O6AXL	
---	---	---------	---------	-----	-----	-------	--

[COMMENT] These optional profiles are used to signal a content item that actually constitutes a collection of media content items.

7 Image Class Media Format Profiles

7.1 JPEG profiling guidelines

7.1.1 JPEG SM format profile

7.1.1.1

[PROFILES]

JPEG_SM

7.1.1.2

[GUIDELINE] The DLNA JPEG_SM shall comply with the following requirements.

File format:

- EXIF Ver.1.x or later;
- JFIF 1.02.

Image compression:

The primary image data compression (even in JFIF or EXIF 1.x file format) shall be conformant to EXIF Ver.2.21 JEITA CP-3451-1 with the following additional constraints:

Maximum resolution:

- the resolution of the image shall not exceed 640 pixels in the ImageWidth field and shall not exceed 480 pixels in the ImageHeight field.

Huffman table:

- the typical Huffman table defined by JPEG standard.

Color space:

- sRGB;
- Uncalibrated color space.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461	U96OF
---	---	-----	-----	-----	--	-------

[COMMENT]

- a) The constraints on JPEG compression are equivalent to those of DCF. Digital still cameras create images compliant with DCF JEITA CP-3461. The maximum resolution, 640 × 480, is selected for a resource-constrained Rendering Endpoint.

- b) Dedicated photo players (e.g. HDTV photo player) are encouraged to decode higher-resolution images if a DMS provides DLNA JPEG_MED or DLNA JPEG_LRG formatted images in addition to DLNA JPEG-SM.
- c) Serving Endpoint is allowed to expose images file-formatted according to earlier versions of EXIF (i.e., EXIF 1.x), due to backward compatibility of those file formats. The compression aspects of such images are not covered by this relaxation rule.

7.1.2 JPEG MED format profile

7.1.2.1

[PROFILES]

JPEG_MED

7.1.2.2

[GUIDELINE] The DLNA JPEG_MED Media Format shall follow the requirement of 7.1.1.2 DLNA JPEG_SM profile except for the following image resolution requirements.

Maximum resolution:

the resolution of the image shall not exceed 1 024 pixels in the ImageWidth field and shall not exceed 768 pixels in the ImageHeight field.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461	6OFWY
---	---	-----	-----	-----	--	-------

7.1.3 JPEG LRG format profile

7.1.3.1

[PROFILES]

JPEG_LRG

7.1.3.2

[GUIDELINE] The DLNA JPEG_LRG Media Format shall follow the requirements of 7.1.1.2 DLNA JPEG_SM profile except for the following image resolution requirements.

Maximum resolution:

the resolution of the image shall not exceed 4 096 pixels in the ImageWidth field and shall not exceed 4 096 pixels in the ImageHeight field.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461	SXDYL	
---	---	-----	-----	-----	--	-------	--

7.1.4 JPEG format profile

7.1.4.1

[PROFILES]

JPEG_LRG

JPEG_MED

7.1.4.2

[GUIDELINE] If a Serving Endpoint exposes a content item in JPEG_LRG or JPEG_MED, the content item shall be converted into the JPEG_SM profile and exposed as such to other devices in the home network.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	n/a	ZVVWJ	
---	---	-----	-------	-----	-----	-------	--

[COMMENT] Vendors can choose any suitable decimation algorithm for the conversion of large and medium-sized images into small ones.

7.1.5 JPEG_RES_<H>_<V> format profile

7.1.5.1

[PROFILE]

JPEG_RES_<H>_<V>

7.1.5.2

[GUIDELINE] The JPEG_RES_<H>_<V> profile shall conform to all aspects of the JPEG_SM profile, as specified in 7.1.1.2, except as noted here:

Image resolution:

- the image can have any resolution; the resolution is exposed explicitly as part of the profile using the following syntax;
- <H> represents the horizontal resolution (ImageWidth field) measured in pixels;
- <V> represents the vertical resolution (ImageHeight field) measured in pixels.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461	5Y4UT	
---	---	-----	-----	-----	--	-------	--

[COMMENT]

- a) The use of this profile requires indicating explicitly the horizontal and vertical resolution of an image as part of the Profile ID. For example, if a JPEG image has a size of 2 048 (width) and 740 (height), then the Profile ID is JPEG_2048_740.
- b) This profile is used mainly by UPnP AV MediaRenderer devices. A UPnP AV MediaRenderer always renders JPEG_SM content, but it can choose to support a number of larger resolutions. An UPnP AV MediaRenderer can use this profile to declare the set of preferred resolutions that it renders. For example, a picture frame that renders the mandatory JPEG_SM profile could also render larger pictures of sizes 800 × 600 and 1 024 × 768. This device can advertise support for JPEG_SM, JPEG_800_600, and JPEG_1024_768.

7.1.6 Use of JPEG_RES_<H>_<V> in a <res> element**7.1.6.1****[PROFILES]****JPEG_RES_<H>_<V>****7.1.6.2**

[GUIDELINE] If a Content Source exposes an image resource in a <res> element with a profile ID of JPEG_RES_<H>_<V>, the same resource shall include a res@resolution field with matching horizontal and vertical resolution values.

[ATTRIBUTES]

M	R	DMS +PU+	M-DMS	n/a	ISO/IEC 29341-3-12	OBQJU	
---	---	----------	-------	-----	-----------------------	-------	--

[COMMENT]

- a) If a profile of the form JPEG_RES_<H>_<V> is used in the CDS, the UPnP AV MediaServer needs to include the resolution information using the res@resolution property. If the profile is used in a DIDL-Lite fragment exposed by a Push Controller (+PU+), the controller needs to also include re@resolution in addition to the Profile ID. This requirement improves backward compatibility with Content Receivers that do not understand the new profile.
- b) This JPEG profile is valuable mostly for use in a UPnP AV MediaRenderer. In this case, the profile provides the actual horizontal and vertical resolution of images that can be rendered by the device.

7.1.6.3

[GUIDELINE] If a UPnP AV MediaRenderer declares support for JPEG_RES_<H>_<V> in response to a CMS:GetProtocolInfo() action, and the horizontal and vertical resolutions are such that they match either the JPEG_MED or JPEG_LRG profiles, the device may additionally declare support for the corresponding profile (JPEG_MED or JPEG_LRG).

[ATTRIBUTES]

O	R	DMR	n/a	n/a	ISO/IEC 29341-3-12	MYQZ2	
---	---	-----	-----	-----	-----------------------	-------	--

[COMMENT]

- a) If a profile of the form JPEG_RES_<H>_<V> is used by a UPnP AV MediaRenderer, this device does not need to declare support for JPEG_MED or JPEG_LRG. This functionality helps small rendering devices that can receive pictures but cannot easily scale pictures to match the screen size. This functionality also helps rendering devices that implement partial support for JPEG_LRG or JPEG_MED but are unable to support the whole range of sizes.
- b) JPEG_SM is a mandatory profile that necessarily appears in the response to CMS:GetProtocolInfo() for devices that render the image class.

7.1.6.4

[GUIDELINE] If a Content Source exposes an image resource in a <res> element with a profile ID of JPEG_RES_<H>_<V>, and the horizontal and vertical resolution values are such that the content can be described as JPEG_SM, JPEG_MED, or JPEG_LRG, the Content Source shall simultaneously expose an alternative <res> element for the same item using one of these three profiles.

[ATTRIBUTES]

M	R	DMS +PU+	M-DMS	n/a	ISO/IEC 29341-3-12	XFWTM	
---	---	----------	-------	-----	-----------------------	-------	--

[COMMENT] This guideline ensures backward compatibility with receiving devices that only understand the JPEG_SM, JPEG_MED, or JPEG_LRG profiles.

7.1.6.5

[GUIDELINE] If a Content Source exposes an image resource in a <res> element with a profile ID of JPEG_RES_<H>_<V> and the horizontal and vertical resolution values are such that the content cannot be described as JPEG_SM, the Content Source shall expose simultaneously an alternative <res> element for the same item using the JPEG_SM profile.

[ATTRIBUTES]

M	R	DMS +PU+	M-DMS	n/a	ISO/IEC 29341-3-12	BHM2E	
---	---	----------	-------	-----	-----------------------	-------	--

[COMMENT] This guideline describes a requirement similar to guideline 7.1.4.2. Any image whose size is larger than JPEG_SM has to be converted into an image of size JPEG_SM. The converted image is exposed as an alternative <res> element within the same item in the CDS.

7.1.6.6

[GUIDELINE] A UPnP AV MediaRenderer that renders JPEG content should declare its preferred resolutions using profile JPEG_RES_<H>_<V>. A UPnP AV MediaRenderer declares support for Media Format Profiles in the response to the CMS:GetProtocolInfo() action.

[ATTRIBUTES]

S	R	DMR	n/a	n/a	n/a	2EDUM	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This guideline defines the main use of profile JPEG_RES_<H>_<V>. If a UPnP AV MediaRenderer declares the preferred resolution, the device pushing an image can resize the image to match exactly the renderer's preferred resolution.

7.1.7 JPEG TN format profile**7.1.7.1****[PROFILES]****JPEG_TN****7.1.7.2**

[GUIDELINE] The DLNA JPEG_TN Media Format shall follow the requirements of 7.1.1.2 DLNA JPEG_SM baseline format except for the following requirements.

In an EXIF file a thumbnail image can be stored as a thumbnail component in addition to the primary image. However, in the JPEG_TN format profile, the thumbnail image shall be stored as the primary image data of the file.

Maximum resolution:

the resolution of the image shall not exceed 160 pixels in the ImageWidth field and shall not exceed 160 pixels in the ImageHeight field.

The DLNA JPEG_TN profile shall be used only for a thumbnail representation of some content.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461 IEC 62481-1-1: 2017	6SXDY	
---	---	-----	-----	-----	---	-------	--

[COMMENT] A thumbnail representation of a content item is exposed in the CDS as described in 10.1.4.6 of IEC 62481-1-1:2017.

7.1.8 JPEG SM ICO format profile**7.1.8.1****[PROFILES]****JPEG_SM_ICO****7.1.8.2**

[GUIDELINE] The JPEG_SM_ICO Media Format Profile shall follow the requirements of 7.1.1.2 DLNA JPEG_SM profile, except for the following requirements.

Required resolution:

the resolution of the image shall be 48 pixels in the ImageWidth field and shall be 48 pixels in the ImageHeight field.

NOTE This Mmedia Format Profile is for use with guideline IEC 62481-1-1:2017, 9.2.28 (DDC UPnP device icons) and other guidelines in the future that call for an icon image Media Format Profile.

A CDS Object shall not contain a <res> element which specifies a content binary conforming to this Profile ID.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461 IEC 62481-1-1:2017	OFWYD
---	---	-----	-----	-----	--	-------

[COMMENT] This Media Format Profile is essentially the same as the JPEG_SM profile, except it specifies a very small image size for use in scenarios involving small icons.

7.1.9 JPEG LRG ICO format profile

7.1.9.1

[PROFILES]

JPEG_LRG_ICO

7.1.9.2

[GUIDELINE] The JPEG_LRG_ICO Media Format Profile shall follow the requirements of 7.1.1.2 DLNA JPEG_SM profile, except for the following requirements.

Required resolution:

the resolution of the image shall be 120 pixels in the ImageWidth field and shall be 120 pixels in the ImageHeight field.

NOTE This Mmedia Format Profile is for use with guideline IEC 62481-1-1:2017, 9.2.28 (DDC UPnP device icons) and other guidelines in the future that call for an icon image Mmedia Format Profile.

A CDS Object shall not contain a <res> element that specifies a content binary conforming to this Profile ID.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 10918-1 JEITA CP-3451 JEITA CP-3451-1 JPEG File Interchange Format JEITA CP-3461 IEC 62481-1-1: 2017	VVWJZ	
---	---	-----	-----	-----	--	-------	--

[COMMENT] This Media Format Profile is essentially the same as the JPEG_SM profile, except it specifies a smaller image size for use in scenarios involving large icons.

7.1.10 JPEG format profile: MIME type definition**7.1.10.1****[PROFILES]****JPEG_SM****JPEG_MED****JPEG_LRG****JPEG_TN****JPEG_RES_<H>_<V>****7.1.10.2**

[GUIDELINE] MIME type "image/jpeg" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	AXLTY	
---	---	-----	-----	-----	-----	-------	--

7.2 PNG profiling guidelines**7.2.1 PNG TN format profile****7.2.1.1****[PROFILES]****PNG_TN****7.2.1.2**

[GUIDELINE] The PNG_TN profile shall follow the requirements of 7.2.2 PNG_SM_ICO profile specification, except for the following requirements.

Maximum resolution:

the resolution of the image shall not exceed 160 pixels in the Width field and shall not exceed 160 pixels in the Height field.

DLNA MF profileID "PNG_TN" shall be used to identify content of this profile.

The PNG_TN Media Format Profile shall be used only for a thumbnail representation of some content.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 15948:2004 W3C PNG:2003 IEC 62481-1-1: 2017	MM785
---	---	-----	-----	-----	---	-------

[COMMENT] A thumbnail representation of a content item is exposed in the CDS as described in 10.1.4.6 of IEC 62481-1-1:2017.

7.2.2 PNG SM ICO format profile

7.2.2.1

[PROFILES]

PNG_SM_ICO

7.2.2.2

[GUIDELINE] The PNG_SM_ICO profile shall follow the requirements of ISO/IEC 15948:2004 recommendations as well as the following restrictions and guidelines described in the entries below.

Maximum resolution:

the resolution of the image shall be 48 pixels in the Width field and shall be 48 pixels in the Height field.

The MIME type for this image profile shall be "image/png".

The image shall use one of the following colour types, defined in ISO/IEC 15948:2004, 6.1:

- Greyscale (with or without tRNS chunks);
- Truecolour (with or without tRNS chunks);
- Indexed-colour (with or without tRNS chunks);
- Greyscale with alpha;
- Truecolour with alpha.

The total number of bits (excluding alpha channel bits) needed to represent a colour shall not exceed 24 bits, as described below:

- Greyscale: 8 bit or 16 bit;
- Truecolour: 24 bit (triplet of 8 bit R/G/B samples);
- Indexed-colour: 24 bit (palette entry is a triplet 8 bit R/G/B samples);
- Greyscale with alpha: 8 bit or 16 bit (with matching alpha channel depth);
- Truecolour with alpha: 24 bit (triplet of 8 bit R/G/B samples, alpha channel shall be 8 bit).

The image shall use "interlace method 0" (also known as the null method), as described in ISO/IEC 15948:2004, 8.2.

NOTE This Media Format Profile is for use with guideline IEC 62481-1-1:2017, 9.2.28 (DDC UPnP device icons) and other guidelines in the future that call for an icon image Media Format Profile.

A CDS Object shall not contain a <res> element that specifies a content binary conforming to this Profile ID.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 15948:2004 W3C PNG:2003 IEC 62481-1-1: 2017	6AXLT	
---	---	-----	-----	-----	---	-------	--

[COMMENT]

- a) The W3C PNG Recommendation W3C PNG:2003 has also been made into an International Standard, ISO/IEC 15948:2004. The purpose of this Media Format Profile is to define a subset of the PNG specification for UPnP device icons and image thumbnails. PNG's capability for lossless compression and transparency makes it ideal for extremely small image sizes.
- b) Rendering Endpoints for this media profile do not need to claim full compliance with the PNG renderer per W3C PNG:2003, 13.1. PNG decoder implementations can be built specifically for this Media Format Profile and not claim full compliance to the PNG specification. This guideline allows for transparency.
- c) This guideline specifies the bit-depth individual sampling channels as well as the total bit depth for a colour.
- d) Since the home network generally has higher bandwidth and lower latency than the Internet, "interlace method 1" (also known as Adam7) is less useful.

7.2.3 PNG LRG ICO format profile

7.2.3.1

[PROFILES]

PNG_LRG_ICO

7.2.3.2

[GUIDELINE] The PNG_LRG_ICO profile shall follow the requirements of 7.2.2 PNG_SM_ICO profile, except for the following requirements.

Maximum resolution:

the resolution of the image shall be 120 pixels in the Width field and shall be 120 pixels in the Height field.

NOTE This Media Format Profile is for use with guideline IEC 62481-1-1:2017, 9.2.28 (DDC UPnP device icons) and other guidelines in the future that call for an icon image Media Format Profile.

A CDS Object shall not contain a <res> element which specifies a content binary conforming to this Profile ID.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 15948:2004 W3C PNG:2003 IEC 62481-1-1: 2017	SMM78	
---	---	-----	-----	-----	---	-------	--

7.2.4 PNG LRG format profile

7.2.4.1

[PROFILES]

PNG_LRG

7.2.4.2

[GUIDELINE] PNG_LRG Media Format Profile shall follow Media Format profiling requirements of PNG_SM_ICO, except for the following distinctive profiling elements.

The resolution of the image shall not exceed 4 096 pixels in the Width field and shall not exceed 4 096 pixels in the Height field.

Interlace 0 method only. (Interlaced images are not supported.)

The following bit depths are supported by PNG_LRG. (Bit depths not supported by PNG_SM_ICO and PNG_LRG_ICO are in Bold.)

Greyscale:

- 1;
- 2;
- 4;
- 8;
- 16.

True color:

- 8 (24 bit total. Triplet of 8 bit R/G/B).

Indexed colour:

- 1;
- 2;
- 4;
- 8.

Grayscale with alpha:

- 8;
- 16.

True colour with alpha:

- 8.

The following chunks shall be supported:

- IHDR;
- PLTE;
- IDAT;
- IEND.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 15948:2004 W3C PNG:2003	K5TBN	
---	---	-----	-----	-----	---------------------------------------	-------	--

7.2.5 PNG format profile: ancillary chunks**7.2.5.1****[PROFILES]****PNG_LRG****7.2.5.2**

[GUIDELINE] A bitstream conformant with this profile may include the following ancillary chunks:

- bKGD;
- tRNS;
- sRGB.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 15948:2004 W3C PNG:2003	77AY8	
---	---	-----	-----	-----	---------------------------------------	-------	--

7.2.6 PNG format profile: MIME type definition**7.2.6.1****[PROFILES]****PNG_LRG****PNG_TN****7.2.6.2**

[GUIDELINE] MIME type "image/png" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	7AY8C	
---	---	-----	-----	-----	-----	-------	--

7.3 GIF profiling guidelines**7.3.1 GIF LRG format profile****7.3.1.1****[PROFILES]****GIF_LRG**

7.3.1.2

[GUIDELINE] The DLNA GIF_LRG profile shall follow the requirements of GIF89a, and the following restrictions and guidelines described in the entries below.

File format:

GIF.

Maximum resolution:

the resolution of the image shall not exceed 1 600 pixels in the Width field and shall not exceed 1 200 pixels in the Height field.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	GIF89a	YAJVS	A
---	---	-----	-----	-----	--------	-------	---

7.3.2 GIF format profile: MIME type definition

7.3.2.1

[PROFILES]

GIF_LRG

7.3.2.2

[GUIDELINE] MIME type "image/gif" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	IETF RFC 2046	S7HER	
---	---	-----	-----	-----	---------------	-------	--

[COMMENT] A thumbnail representation of a content item is exposed in the CDS as described in 10.1.4.6 of IEC 62481-1-1:2017.

8 Audio Class Media Format profiles

8.1 AC-3 profiling guidelines

8.1.1 AC-3 audio format

8.1.1.1

[PROFILES]

AC3

8.1.1.2

[GUIDELINE] Main characteristics of the AC-3 audio stream are defined in ATSC Standard A/52:2012.

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following AC-3 formats:

- 1/0 (Mono);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 3/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel).

Changing audio channels among mono and stereo is allowed.

Bitrate (variable):

- 64 kbit/s to 640 kbit/s.

Payload format:

- Payload format is raw bitstream.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/52:2012	FSJTK
---	---	-----	-----	-----	-------------------------	-------

8.1.2 AC-3 audio format: MIME type definition

8.1.2.1

[PROFILES]

AC3

8.1.2.2

[GUIDELINE] MIME type "audio/ac3" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	8727Z
---	---	-----	-----	-----	-----	-------

8.2 DTS Digital Surround profiling guidelines

8.2.1 DTS Digital Surround audio format

8.2.1.1

[PROFILES]

DTS

8.2.1.2

[GUIDELINE] The main characteristics of this DTS audio stream are defined in ETSI TS 102 114.

Sampling rate:

- 44,1 kHz;
- 48 kHz;
- 88,2 kHz;
- 96 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multi-channel (3);
- Multi-channel (4);
- Multi-channel (5);
- Multichannel (5.1);
- Multichannel (6.1).

Bitrate

- CBR: 192 kbit/s to 1 509 kbit/s.

Payload format:

- Payload format is raw elementary bitstream.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 114	97ZQ7
---	---	-----	-----	-----	-----------------	-------

8.2.2 DTS Digital Surround audio format: MIME type definition

8.2.2.1

[PROFILES]

DTS

8.2.2.2

[GUIDELINE] MIME type "audio/vnd.dts" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	Q8RVV
---	---	-----	-----	-----	-----	-------

8.3 DTS-HD profiling guidelines

8.3.1 DTS-HD audio format

8.3.1.1

[PROFILE]

DTSHD

8.3.1.2

[GUIDELINE] The main characteristics of this DTSHD audio stream are defined in ETSI TS 102 114.

Sampling rate:

- 44,1 kHz;
- 48 kHz;
- 88,2 kHz;
- 96 kHz;
- 176,4 kHz;
- 192 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multi-channel (2.1);
- Multi-channel (3);
- Multi-channel (3.1);
- Multi-channel (4);
- Multi-channel (4.1);
- Multi-channel (5);
- Multi-channel (5.1);
- Multi-channel (6);
- Multi-channel (6.1);
- Multi-channel (7);
- Multi-channel (7.1);
- Multi-channel (8).

Bitrate:

- CBR: 24 kbits/s to 6 Mbits/s;
- VBR: up to 24,5 Mbits/s.

Payload format

- Payload format is raw bitstream.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 114	CC2P5	N
---	---	-----	-----	-----	--------------------	-------	---

[COMMENT] DTS-HD audio may be published under the following copyrighted name identifiers:

DTS Express;
DTS-HD High Resolution Audio;
DTS-HD Master Audio.

8.3.2 DTS-HD audio format: MIME type definition

8.3.2.1

[PROFILES]

DTSHD

8.3.2.2

[GUIDELINE] MIME type "audio/vnd.dts.hd" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	7ZQ79
---	---	-----	-----	-----	-----	-------

8.4 Enhanced AC-3 profiling guidelines

8.4.1 Enhanced AC-3 audio format

8.4.1.1

[PROFILES]

EAC3

8.4.1.2

[GUIDELINE] Main characteristics of the Enhanced AC-3 audio stream are defined in ETSI TS 102 366:2014.

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- Dual Monaural (1 + 1);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 3/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel);
- > 3/2 (Multichannel).

The channel modes listed above may include an LFE channel.

The channel mode may change within the bitstream.

➤ Substream usage

- All substreams shall be encoded at the same sample rate;
- All substreams shall be encoded with the same number of audio data blocks per syncframe.

Bitrate:

- CBR or VBR: 32 kbit/s to 6 144 kbit/s.

Payload format:

- Payload format is raw bitstream.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 366:2014	ZQ79P
---	---	-----	-----	-----	-------------------------	-------

8.4.2 Enhanced AC-3 audio format: MIME type definition

8.4.2.1

[PROFILES]

EAC3

8.4.2.2

[GUIDELINE] MIME type "audio/eac3" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	VVE7W
---	---	-----	-----	-----	-----	-------

8.4.3 Enhanced AC-3 audio format

8.4.3.1

[PROFILES]

EAC3_ISO

8.4.3.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the EAC3 audio format profile as specified in 8.4.1, except as noted here:

Sampling rate:

- 44,1 kHz;
- 48 kHz.

Bitrate:

- CBR or VBR: 32 kbps to 3 024 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	NZFEN	N
---	---	-----	-----	-----	-----	-------	---

8.4.3.3

[GUIDELINE] The Enhanced AC-3 bitstream shall be stored in a file that conforms to the ISO Base Media File Format (ISO/IEC 14496-12:2012), as specified in Annex F of ETSI TS 102 366:2014.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2012 ETSI TS 102 366:2014	DIDC3	N
---	---	-----	-----	-----	---	-------	---

8.4.3.4

[GUIDELINE] Rendering Endpoints conformant with this Media Format Profile shall also be capable of rendering content that conforms to the EAC3 audio format profile as specified in 8.4.1.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	DTM5B	N
---	---	---------	-------	-----	-----	-------	---

8.4.4 Enhanced AC-3 audio format: MIME type definition

8.4.4.1

[PROFILES]

EAC3_ISO

8.4.4.2

[GUIDELINE] MIME type "audio/mp4" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	HS62C	N
---	---	-----	-----	-----	-----	-------	---

8.5 LPCM profiling guidelines

8.5.1 LPCM audio format

8.5.1.1

[PROFILES]

LPCM

8.5.1.2

[GUIDELINE] This audio format specification shall follow profiling of IETF RFC 3555, which defines the MIME encapsulation for the LPCM DLNA Media Format and uses the "L16" audio Media Format defined by IETF RFC 3551. "L16" denotes uncompressed audio data, using 16-bit signed representation in two's complement notation and network byte order.

There are the following parameter constraints to "L16" as defined by DLNA.

Sampling rates:

- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- A bitstream conformant with this Media Format Profile may contain the following formats:
 - Mono (1);
 - Stereo (2).

Quantization:

- 16 bit.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	IETF RFC 3555 IETF RFC 3551	F7Q8T
---	---	-----	-----	-----	--------------------------------	-------

[COMMENT] Sample rate and the number of channels parameters are provided in the MIME type header. The "channels" parameter is not required by IETF RFC 3555. The default channel ordering for 2-channel content is:

Channel 1: Left,
Channel 2: Right,

as indicated by IETF RFC 3555.

8.5.2 LPCM audio format: Transport Alignment Position

8.5.2.1

[PROFILES]

LPCM

8.5.2.2

[GUIDELINE] The Transport Alignment Position for bitstreams conformant to this profile shall be the sample boundary. For monaural streams, this is a 16-bit sample, and for stereo streams this is a pair of 16-bit samples, one for each channel.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	n/a	7Q8TS
---	---	-----	-----	-----	-----	-------

[COMMENT] Channel order for Stereo bitstreams is defined in 8.5.1.

8.5.3 LPCM audio format: MIME type definition

8.5.3.1

[PROFILES]

LPCM

8.5.3.2

[GUIDELINE] MIME type "audio/L16" shall be used for this Media Format Profile.

The "channels" parameter should be included in the MIME type header exposed by a Serving Endpoint.

The value of the "channels" parameter directly corresponds to the number of channels of the core LPCM stream, i.e. either 1 for Mono or 2 for Stereo.

If a Serving Endpoint does not include the "channels" parameter in the MIME typeheader, the default value assumed by the Rendering Endpoint shall be 1. If the number of channels in the core LPCM stream is 2 then the Serving Endpoint shall indicate this in the MIME type header so that the Rendering Endpoint is always able to correctly determine the number of channels.

The "rate" parameter shall be included in the MIME type header exposed by the Serving Endpoint.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	IETF RFC 3555	TD65Y
---	---	-----	-----	-----	---------------	-------

[COMMENT] An example MIME type for stereo LPCM with 48 kHz sampling rate is:

audio/L16;channels=2;rate=48000.

This guideline specifies that a Serving Endpoint shall expose only the MIME types of the partial parameter sets it supports in the CMS.SourceProtocolInfo instance state variable, see guideline 6.1.7.3. If, for example the Serving Endpoint supports mono LCPM at sampling rates of 44,1 kHz and stereo at 48 kHz, then it needs to list only the following information in the protocolInfo:

http-get:*: audio/L16;channels=1;rate=44100:DLNA.ORG_PN=LPCM

http-get:*: audio/L16;channels=2;rate=48000:DLNA.ORG_PN=LPCM

or

http-get:*: audio/L16; rate=44100:DLNA.ORG_PN=LPCM

http-get:*: audio/L16; channels=2; rate=48000:DLNA.ORG_PN=LPCM

since the channels parameter may be omitted for a mono stream.

8.6 MLP profiling guidelines

8.6.1 MLP audio format

8.6.1.1

[PROFILES]

MLP

8.6.1.2

[GUIDELINE] Main characteristics of the MLP audio stream are defined in DVD Specifications:2005.

Sampling rate:

- 44,1 kHz;
- 48 kHz;
- 88,2 kHz;
- 96 kHz;
- 176,4 kHz;
- 192 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel);
- >3/2 (Multichannel).

The channel modes listed above may include an LFE channel.

The channel mode may change within the bitstream.

Bitrate:

- VBR: Maximum of 18,0 Mbit/s.

Payload format:

- Payload format is raw bitstream.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	DVD Specifications:2005	6X39V
---	---	-----	-----	-----	-------------------------	-------

8.6.2 MLP audio format: MIME type definition

8.6.2.1

[PROFILES]

MLP

8.6.2.2

[GUIDELINE] MIME type "audio/vnd.dolby.mlp" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	Q79P4
---	---	-----	-----	-----	-----	-------

8.6.3 MLP audio format

8.6.3.1

[PROFILES]

MLP_ISO

8.6.3.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the MLP audio format profile as specified in 8.6.1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	IJQSX	N
---	---	-----	-----	-----	-----	-------	---

8.6.3.3

[GUIDELINE] The MLP bitstream shall be stored in a file that conforms to the ISO Base Media File Format (ISO/IEC 14496-12:2012), as specified in Dolby® TrueHD Bitstreams.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2012 Dolby® TrueHD Bitstreams	ZBMDK	N
---	---	-----	-----	-----	---	-------	---

8.6.3.4

[GUIDELINE] Rendering Endpoints conformant with this Media Format Profile shall also be capable of rendering content that conforms to the MLP audio format profile as specified in 8.6.1.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	9A334	N
---	---	---------	-------	-----	-----	-------	---

8.6.4 MLP audio format: MIME type definition

8.6.4.1

[PROFILES]

MLP_ISO

8.6.4.2

[GUIDELINE] MIME type "audio/mp4" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	7PIK4	N
---	---	-----	-----	-----	-----	-------	---

8.7 MPEG-1/2 profiling guidelines

8.7.1 MPEG-1/2 Layer 2 audio format

8.7.1.1

[PROFILES]

MP2_MPS

8.7.1.2

[GUIDELINE] Audio encoding shall match the provisions for MPEG-1/2 Audio Layer 2 as defined in ISO/IEC 11172-3.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 11172-3	S5L95	
---	---	-----	-----	-----	--------------------	-------	--

8.7.1.3

[GUIDELINE] Audio encoding shall match the provisions for one of the following levels in the MPS Profile as defined in ISO/IEC 23003-1:2007. The appropriate parameters shall be set for level and profile.

Profiles and levels:

- MPS Baseline Profile at Level 1;
- MPS Baseline Profile at Level 2;
- MPS Baseline Profile at Level 3;
- MPS Baseline Profile at Level 4.

Sampling rate (normative):

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multichannel (3);
- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1);
- Multichannel (7.1).

Maximum bitrate (normative):

- 384 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 23003-1:2007	X39VJ	
---	---	-----	-----	-----	-------------------------	-------	--

[COMMENT] MPEG1 Layer 2 is used for encoding of up to 2 core channels. MPS Levels 1 to 4 allow different numbers of input and output channels, and a different bandwidth of the residual signal decoding. The inherent bitstream level compatibility of MPEG Surround enables decoders of level 1, 2, 3 and 4 to decode bitstreams of all levels, though at a possibly slightly reduced quality due to the limitations of the decoder. This means that the highest possible reproduction quality is only ensured when the level of the decoder is equal to or larger than the level of the bitstream.

8.7.2 MPEG-1/2 Layer 2 audio format: MPS signaling

8.7.2.1

[PROFILES]

MP2_MPS

8.7.2.2

[GUIDELINE] The MP2_MPS Media Format shall follow the transport and signaling requirements for MPEG Surround as defined in ISO/IEC 23003-1:2007, 7.2.4.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 23003-1:2007	VETWS
---	---	-----	-----	-----	-------------------------	-------

8.7.3 MPEG-1/2 Layer 2 audio format: MIME type definition

8.7.3.1

[PROFILES]

MP2_MPS

8.7.3.2

[GUIDELINE] MIME type "audio/mpeg" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	79P4N
---	---	-----	-----	-----	-----	-------

8.8 MP3 profiling guidelines

8.8.1 MP3 audio format

8.8.1.1

[PROFILES]

MP3

8.8.1.2

[GUIDELINE] MP3 audio Media Format shall abide by the following baseline characteristics:

Audio encoding shall be MPEG-1 Layer 3 audio as defined in ISO/IEC 11172-3.

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2).

Sampling rates:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Bitrate:

- 32 kbit/s;
- 40 kbit/s;
- 48 kbit/s;
- 56 kbit/s;
- 64 kbit/s;
- 80 kbit/s;
- 96 kbit/s;
- 112 kbit/s;
- 128 kbit/s;
- 160 kbit/s;
- 192 kbit/s;
- 224 kbit/s;
- 256 kbit/s;
- 320 kbit/s.

Encoding types:

- Constant Bit Rate (CBR);
- Variable Bit Rate (VBR).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 11172-3	5QE3Y
---	---	-----	-----	-----	--------------------	-------

[COMMENT] The bitrates list represents the maximum rate for VBR audio encoding type.

8.8.2 MP3 audio format: ID3 tag tolerance**8.8.2.1****[PROFILES]****MP3****8.8.2.2**

[GUIDELINE] A bitstream conformant with this profile may contain ID3 tags as defined in ID3 tag.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ID3 tag	9B4OZ
---	---	-----	-----	-----	---------	-------

8.8.3 MP3 audio format: ID3 tag placement

8.8.3.1

[PROFILES]

MP3

8.8.3.2

[GUIDELINE] If MP3 ID3v2 tag ID3 tag , the tag with the ID3v2 header should be prepended to the MPEG-1 Layer3 audio bit stream ISO/IEC 11172-3. That is, the ID3v2 header is positioned at the beginning of the content binary.

[ATTRIBUTES]

S	L	n/a	n/a	n/a	ISO/IEC 11172-3 ID3 tag	75FAY
---	---	-----	-----	-----	-------------------------	-------

8.8.4 MP3 audio format: MIME type definition

8.8.4.1

[PROFILES]

MP3

8.8.4.2

[GUIDELINE] MIME type "audio/mpeg" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	Y5QE3
---	---	-----	-----	-----	-----	-------

8.9 MPEG-4 profiling guidelines

8.9.1 General

The DLNA-defined profiles of MPEG-4 are based on MPEG-2/4 AAC, MPEG-4 High Efficiency AAC, and MPEG-4 High Efficiency AAC v2. There are guidelines for both stereo and multichannel audio and several supported file formats. Many of the audio profiles incorporating AAC have a hierarchical relationship to each other. A DMP capable of rendering any of the multichannel AAC profiles is also capable of rendering the corresponding profiles with fewer channels. In addition, some profiles differ only in whether a bitrate restriction is imposed. A hierarchical relationship exists here, too, where a DMP capable of rendering a non-restricted bitrate profile is also capable of rendering the corresponding profile with a bitrate restriction. Furthermore, the "HE-AAC" profiles and "HE-AACv2" profiles are each a superset of a corresponding "AAC" profile because they all use the AAC-LC audio object. The "HE-AACv2" profiles are also a superset of a corresponding "HE-AAC" profile.

Additionally, similar hierarchical relationships exist between profiles using MPEG Surround. MPS profiles are a superset of their corresponding core audio profile, and a DMP capable of rendering any of the MPS profiles is also capable of rendering the core audio profile that the MPS profile is based upon. The hierarchical relationship between HE-AAC and AAC profiles as described above is also maintained when MPS information is included, for example, in the case of the HEAAC_MPS profile.

Table 25 – MPEG-4 audio profile hierarchy

		Content items in this profile																							
		MPEG2_AAC_MPS	AAC_ADTS_192	AAC_ISO_192	AAC_ADTS_320	AAC_ISO_320	AAC_ADTS	AAC_ISO	AAC_MULT5_ADTS	AAC_MULT5_ISO	AAC_MPS	HEAAC_L2_ADTS_320	HEAAC_L2_ADTS	HEAAC_L2_ISO_128	HEAAC_L2_ISO_320	HEAAC_L4	HEAAC_MULT5_ADTS	HEAAC_MULT5_ISO	HEAACv2_L2_320	HEAACv2_L2_128	HEAACv2_L2	HEAACv2_L4	HEAACv2_L2_MPS_DAB		
DMP renders this profile	MPEG2_AAC_MPS	X																							
	AAC_ADTS_192		X																						
	AAC_ISO_192		X	X																					
	AAC_ADTS_320		X		X																				
	AAC_ISO_320		X	X	X	X																			
	AAC_ADTS		X		X		X																		
	AAC_ISO		X	X	X	X	X	X																	
	AAC_MULT5_ADTS		X		X		X		X																
	AAC_MULT5_ISO		X	X	X	X	X	X	X	X															
	AAC_MPS	X	X	X	X	X	X	X			X														
	HEAAC_L2_ADTS_320		X		X							X													
	HEAAC_L2_ADTS		X		X		X					X	X												
	HEAAC_L2_ISO_128													X											
	HEAAC_L2_ISO_320		X	X	X	X						X		X	X										
	HEAAC_L2_ISO												X	X	X	X	X								
	HEAAC_L4		X	X	X	X	X	X				X	X	X	X	X	X								
	HEAAC_MULT5_ADTS		X		X		X		X			X	X					X							
	HEAAC_MULT5_ISO		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X						
	HEAAC_MPS	X	X	X	X	X	X	X			X	X	X	X	X	X				X					
	HEAACv2_L2_320		X	X	X	X						X		X	X						X	X			
HEAACv2_L2_128													X								X				
HEAACv2_L2		X	X	X	X	X	X				X	X	X	X	X					X	X	X			
HEAACv2_L4		X	X	X	X	X	X				X	X	X	X	X	X				X	X	X	X		

Content items in this profile	
	HEAACv2_L2_MPS_DAB
	HEAACv2_L4
	HEAACv2_L2
	HEAACv2_L2_128
	HEAACv2_L2_320
	HEAAC_MPS
	HEAAC_MULT5_ISO
	HEAAC_MULT5_ADTS
	HEAAC_L4
	HEAAC_L2_ISO
	HEAAC_L2_ISO_320
	HEAAC_L2_ISO_128
	HEAAC_L2_ADTS
	HEAAC_L2_ADTS_320
	HEAAC_MPS
	HEAAC_MULT5_ISO
	HEAAC_MULT5_ADTS
	AAC_ISO
	AAC_ADTS
	AAC_ISO_320
	AAC_ADTS_320
	AAC_ISO_192
	AAC_ADTS_192
	MPEG2_AAC_MPS
HEAACv2_L2_MPS_DAB	X

8.9.2 AAC audio format: baseline (1)

8.9.2.1

[PROFILES]

AAC_ADTS

AAC_ISO

8.9.2.2

[GUIDELINE] AAC audio Media Format shall abide by the following baseline characteristics.

Audio encoding shall match the provisions for one of these levels in the (MPEG-4) AAC Profile as defined in ISO/IEC 14496-3:2001. The appropriate parameter in the file format shall be set to the profiles and level.

Profiles and levels:

- AAC Profile at Level 1;
- AAC Profile at Level 2.

Sampling rate:

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 576 kbit/s.

NOTE The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2001/AMD1:2003, maximum bitrate = (6 144 / 1 024) × maximum sampling rate × number of channels.

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2001/A MD1:2003 ISO/IEC 14496-3:2001	5K7XN
---	---	-----	-----	-----	--	-------

[COMMENT]

- a) The MPEG-4 AAC Profile specified in ISO/IEC 14496-3:2001 includes only the AAC-LC Audio Object Type.
- b) Rendering Endpoint meeting the guidelines of the AAC_ISO or AAC_ADTS profiles is capable of a partial bandwidth decode of content using the MPEG-4 SBR coding tool if that content uses one of the implicit signaling modes in 1.6.5 of ISO/IEC 14496-3:2001/AMD1:2003 and uses the DLNA MF profileID "AAC_ISO" or "AAC_ADTS".
- c) The number of channels can change during a content item.

8.9.3 AAC audio format: exception (1): ADTS_320

8.9.3.1

[PROFILES]

AAC_ADTS_320

8.9.3.2

[GUIDELINE] Bitstreams compliant with this profile shall conform to all aspects of the AAC_ADTS profile, except as noted here:

Maximum bitrate (normative):

- 320 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	36YPU
---	---	-----	-----	-----	-----	-------

[COMMENT] In addition to all the provisions defined for AAC_ADTS, this profile requires a maximum content bitrate of 320 kbit/s.

8.9.4 AAC audio format: exception (2): ISO_320

8.9.4.1

[PROFILES]

AAC_ISO_320

8.9.4.2

[GUIDELINE] Bitstreams compliant with this profile shall conform to all aspects of the AAC_ISO profile, except as noted here:

Maximum bitrate (normative):

- 320 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	BSDY3	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] In addition to all the provisions defined for AAC_ISO, this profile requires a maximum content bitrate of 320 kbit/s.

8.9.5 AAC audio format: Rendering Endpoint Capabilities: ISO_320**8.9.5.1****[PROFILES]**

AAC_ISO_320

8.9.5.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicating following profile:

AAC_ADTS_320

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	S8PBS	
---	---	---------	-------	-----	-----	-------	--

8.9.6 AAC audio format: maximum system bitrate: ISO_320**8.9.6.1****[PROFILES]**

AAC_ISO_320

8.9.6.2

[GUIDELINE] The maximum system bitrate, which is defined as the maximum of cumulative bitrate of streams in media data, shall be the following.

System bitrate:

- Up to 340 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	YPUT9	
---	---	-----	-----	-----	-----	-------	--

8.9.7 AAC audio format: exception(3): ADTS_192

8.9.7.1

[PROFILES]

AAC_ADTS_192

8.9.7.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC_ADTS profile as specified in 8.9.2.2, except as indicated below.

Maximum bitrate (normative):

- 192 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	7DWUR
---	---	-----	-----	-----	-----	-------

[COMMENT] This profile is a subset of the AAC_ADTS_320 profile with a reduced bitrate of 192 kbit/s. Content that matches both this profile and the (mandatory – for Mobile Devices) AAC_ADTS_320 profile (see 6.1.6.1 and 6.1.6.2) are urged to be exposed with this profile via an additional <res> element.

8.9.8 AAC audio format: exception(4): ISO_192

8.9.8.1

[PROFILES]

AAC_ISO_192

8.9.8.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC_ISO profile as specified in 8.9.2.2, except as indicated below.

Maximum bitrate (normative):

- 192 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	RS9FK
---	---	-----	-----	-----	-----	-------

[COMMENT] This profile is a subset of the AAC_ISO_320 profile with a reduced bitrate of 192 kbit/s. Content that matches both this profile and the (mandatory – for Mobile Devices) AAC_ISO_320 profile (see 6.1.6.1 and 6.1.6.2) are urged to be exposed with this profile via an additional <res> element.

8.9.9 AAC audio format: Rendering Endpoint Capabilities: ISO_192

8.9.9.1

[PROFILES]

AAC_ISO_192

8.9.9.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicating the following profile:

AAC_ADTS_192.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	Z3X6I	
---	---	---------	-------	-----	-----	-------	--

8.9.10 AAC audio format: maximum system bitrate: ISO_192**8.9.10.1****[PROFILES]**

AAC_ISO_192

8.9.10.2

[GUIDELINE] The maximum system bitrate, which is defined as the maximum bitrate of all streams in the media data, shall be:

- Less than or equal to 204 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	3QSQ5	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] The system bitrate limit adds a 6 % overhead to the audio bitrate limit.

8.9.11 AAC audio format: baseline (2): MULT5**8.9.11.1****[PROFILES]**

AAC_MULT5_ADTS

AAC_MULT5_ISO

8.9.11.2

[GUIDELINE] AAC audio Media Format shall abide by the following baseline characteristics.

Audio encoding shall match the provisions for this level in the (MPEG-4) AAC Profile as defined in ISO/IEC 14496-3:2001. The appropriate parameter in the file format shall be set to the profiles and level.

Profiles and level:

- AAC Profile at Level 4.

Sampling rate:

- 8 kHz;
- 11,025 kHz;
- 12 kHz;

- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 1 440 kbit/s.

NOTE The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2001/AMD1:2003: maximum bitrate = (6 144 / 1 024) * maximum sampling rate * number of channels.

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2);
- Multichannel (3);
- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2001/A MD1:2003 ISO/IEC 14496-3:2001	AS8PB
---	---	-----	-----	-----	--	-------

[COMMENT]

- a) The MPEG-4 AAC Profile specified in ISO/IEC 14496-3:2001 includes only the AAC-LC Audio Object Type.
- b) Rendering Endpoints meeting the guidelines of the AAC_ISO or AAC_ADTS profiles is capable of a partial bandwidth decode of content using the MPEG-4 SBR coding tool if that content uses one of the implicit signaling modes in 1.6.5 of ISO/IEC 14496-3:2001/AMD1:2003 and uses the DLNA MF profileID "AAC_ISO" or "AAC_ADTS".
- c) The MPEG-4 AAC Profile specified in ISO/IEC 14496-3:2001/AMD1:2003 has no Level 3.
- d) The number of channels can change during a content item.

8.9.12 AAC audio format: Rendering Endpoint Capabilities: MULT5_ADTS

8.9.12.1

[PROFILES]

AAC_MULT5_ADTS

8.9.12.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS;
AAC_ADTS_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	RDZSE
---	---	---------	-------	-----	-----	-------

8.9.13 AAC audio format: Rendering Endpoint Capabilities: MULT5_ISO**8.9.13.1****[PROFILES]****AAC_MULT5_ISO****8.9.13.2**

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS;
AAC_ISO;
AAC_ADTS_320;
AAC_ISO_320;
AAC_MULT5_ADTS.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	65B4N
---	---	---------	-------	-----	-----	-------

8.9.14 AAC audio format: baseline (3): L6_ISO**8.9.14.1****[PROFILES]****AAC_L6_ISO****8.9.14.2**

[GUIDELINE] Audio encoding shall match the provisions for Level 6 in the MPEG-4 AAC profile as defined in ISO/IEC 14496-3:2009 and ISO/IEC 14496-3:2009/AMD4:2013. The appropriate parameter in the file format shall be set to the profiles and level:

Profiles and level:

- AAC Profile @ Level 6.

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multichannel (5.1);

- Multichannel (7.1).

Maximum bitrate (informative):

- 2 016 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2009 ISO/IEC 14496-3:2009/A MD4:2013	NW79Y	N
---	---	-----	-----	-----	--	-------	---

8.9.15 AAC audio format: Rendering Endpoint Capabilities: L6_ISO

8.9.15.1

[PROFILES]

AAC_L6_ISO

8.9.15.2

[GUIDELINE] A Rendering Endpoints that conforms to this profile shall also be able to render content that conforms to the following profiles:

- AAC_ISO;
- AAC_ISO_320;
- AAC_MULT5_ISO.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	3W5YM	N
---	---	---------	-------	-----	-----	-------	---

8.9.16 AAC audio format: baseline (4): MPS

8.9.16.1

[PROFILES]

AAC_MPS

8.9.16.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC_ISO profile as specified in 8.9.2, except as noted below.

Profiles and level

- AAC Profile at Level 2

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	7JJ49	
---	---	-----	-----	-----	-----	-------	--

8.9.16.3

[GUIDELINE] Audio encoding shall match the provisions for one of the following levels in the MPS profile as defined in ISO/IEC 23003-1:2007. The appropriate parameters in the file format shall be set to the profiles and level.

Profiles and levels:

- MPS Baseline Profile at Level 1;
- MPS Baseline Profile at Level 2;
- MPS Baseline Profile at Level 3;
- MPS Baseline Profile at Level 4.

Maximum sampling rate:

- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multichannel (3);
- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1);
- Multichannel (7.1).

Maximum bitrate (informative):

- 576 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 23003-1:2007	Y4QHV
---	---	-----	-----	-----	-------------------------	-------

[COMMENT] AAC is used for encoding of up to 2 core channels. MPS Levels 1 to 4 allow different numbers of input and output channels, and a different bandwidth of the residual signal decoding. The inherent bitstream level compatibility of MPEG Surround enables decoders of level 1, 2, 3 and 4 to decode bitstreams of all levels, though at a possibly slightly reduced quality due to the limitations of the decoder. This means that the highest possible reproduction quality is only ensured when the level of the decoder is equal to or larger than the level of the bitstream.

8.9.17 AAC audio format: exception (5): MPEG2_AAC_MPS**8.9.17.1****[PROFILES]****MPEG2_AAC_MPS****8.9.17.2**

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC_MPS profile as specified in 8.9.2, except as noted below.

Profiles and level:

- AAC Low Complexity 2.0.0.0.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-7	POPFT	
---	---	-----	-----	-----	--------------------	-------	--

8.9.18 AAC audio format: MPS signaling

8.9.18.1

[PROFILES]

AAC_MPS

MPEG2_AAC_MPS

[GUIDELINE] The AAC audio format shall follow the transport and signaling requirements for MPEG Surround in an MPEG-4 Audio/Systems Environment as specified in ISO/IEC 23003-1:2007, 7.2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 23003-1:2007	YS597	
---	---	-----	-----	-----	-------------------------	-------	--

8.9.19 HE-AAC audio format: baseline (5): L2_ADTS, L2_ISO

8.9.19.1

[PROFILES]

HEAAC_L2_ADTS

HEAAC_L2_ISO

8.9.19.2

[GUIDELINE] HE-AAC audio Media Format shall abide by the following baseline characteristics:

Audio encoding shall match the provisions for this level in the (MPEG-4) High Efficiency (HE) AAC Profile as defined in ISO/IEC 14496-3:2001/AMD1:2003. The appropriate parameter in the file format shall be set to the profiles and level, as listed below.

Profile and level:

- HE-AAC Profile at Level 2.

AAC sampling rate (SBR present):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz.

AAC sampling rate (SBR not present):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 576 kbit/s.

NOTE The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2001/AMD1:2003, maximum bitrate = $(6\ 144 / 1\ 024) * \text{maximum sampling rate} * \text{number of channels}$

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2001/A MD1:2003 ISO/IEC 14496-3:2001	X65B4	
---	---	-----	-----	-----	--	-------	--

[COMMENT] The MPEG-4 High Efficiency (HE) AAC Profile specified in ISO/IEC 14496-3:2001/AMD1:2003 includes the AAC LC and the SBR Audio Object Types. The MPEG-4 HE-AAC Profile specified in ISO/IEC 14496-3:2001/AMD1:2003 has no Level 1. The number of channels can change during a content item.

8.9.20 HE-AAC audio format: Rendering Endpoint Capabilities: L2_ADTS

8.9.20.1

[PROFILES]

HEAAC_L2_ADTS

8.9.20.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS;
AAC_ADTS_320;
HEAAC_L2_ADTS_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	6YPUT	
---	---	---------	-------	-----	-----	-------	--

8.9.21 HE-AAC audio format: Rendering Endpoint Capabilities: L2_ISO

8.9.21.1

[PROFILES]

HEAAC_L2_ISO

8.9.21.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

- AAC_ADTS;
- AAC_ISO;
- AAC_ADTS_320;
- AAC_ISO_320;
- HEAAC_L2_ADTS;
- HEAAC_L2_ADTS_320;
- HEAAC_L2_ISO_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	K7XN4
---	---	---------	-------	-----	-----	-------

8.9.22 HE-AAC audio format: exception (3): L2_ADTS_320

8.9.22.1

[PROFILES]

HEAAC_L2_ADTS_320

8.9.22.2

[GUIDELINE] Bitstreams compliant with this profile shall conform to all aspects of the HEAAC_L2_ADTS profile, except as noted below.

Maximum bitrate (normative):

- 320 kbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	YLY5Q
---	---	-----	-----	-----	-----	-------

8.9.23 HE-AAC audio format: Rendering Endpoint capabilities

8.9.23.1

[PROFILES]

AAC_MPS

HEAAC_L2_ADTS_320

8.9.23.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS;
 AAC_ISO;
 AAC_ADTS_320;
 AAC_ISO_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	72UWR	
---	---	---------	-------	-----	-----	-------	--

8.9.24 HE-AAC audio format: exception (4): L2_ISO_320**8.9.24.1****[PROFILES]****HEAAC_L2_ISO_320****8.9.24.2**

[GUIDELINE] Bitstreams compliant with this profile shall conform to all aspects of the HEAAC_L2_ISO profile except as noted below.

Maximum bitrate (normative):

- 320 kbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	W7QVX	
---	---	-----	-----	-----	-----	-------	--

8.9.25 HE-AAC audio format: Rendering Endpoint capabilities: L2_ISO_320**8.9.25.1****[PROFILES]****HEAAC_L2_ISO_320****8.9.25.2**

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS_320;
 AAC_ISO_320;
 HEAAC_L2_ADTS_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	G786Q	
---	---	---------	-------	-----	-----	-------	--

8.9.26 HE-AAC audio format: maximum system bitrate: L2_ISO_320

8.9.26.1

[PROFILES]

HEAAC_L2_ISO_320

8.9.26.2

[GUIDELINE] The maximum system bitrate, which is defined as the maximum of cumulative bitrate of streams in media data, shall be the following.

System bitrate:

- Up to 340 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	D7JA9	N
---	---	-----	-----	-----	-----	-------	---

8.9.27 HE-AAC audio format: exception: L2_ISO_128

8.9.27.1

[PROFILES]

HEAAC_L2_ISO_128

8.9.27.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the HEAAC_L2_ISO profile as specified in 8.9.19.2, except as indicated below.

Maximum bitrate (normative):

- 128 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	DWUR7	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This profile is a subset of the HEAAC_L2_ISO and HEAAC_L2_ISO_320 profiles with a reduced bitrate of 128 kbit/s. Content that matches this profile and the HEAAC_L2_ISO profile or HEAAC_L2_ISO_320 profile, or both (see 6.1.6.2), are urged to be exposed with this profile via an additional <res> element.

8.9.28 HE-AAC audio format: baseline (4): MULT5_ADTS, MULT5_ISO

8.9.28.1

[PROFILES]

HEAAC_MULT5_ADTS

HEAAC_MULT5_ISO

8.9.28.2

[GUIDELINE] Bitstreams compliant with the HE-AAC audio Media Format shall abide by the following baseline characteristics.

Audio encoding shall match the provisions for one of these levels in the (MPEG-4) High Efficiency (HE) AAC Profile as defined in ISO/IEC 14496-3:2001/AMD1:2003. The appropriate parameter in the file format shall be set to the profiles and level as listed below.

Profiles and levels:

- HE-AAC Profile at Level 4;
- HE-AAC Profile at Level 5.

AAC sampling rate (with and without SBR):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 1 440 kbit/s.

NOTE The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2001/AMD1:2003, maximum bitrate = $(6\ 144 / 1\ 024) \times$ maximum sampling rate \times number of channels.

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2);
- Multichannel (3);
- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2001/A MD1:2003 ISO/IEC 14496-3:2001	2UWRD
---	---	-----	-----	-----	--	-------

[COMMENT] The MPEG-4 High Efficiency (HE) AAC Profile specified in ISO/IEC 14496-3:2001/AMD1:2003 and ISO/IEC 14496-3:2001 includes the AAC LC and the SBR Audio Object Types.

The number of channels can change during a content item.

8.9.29 HE-AAC audio format: Rendering Endpoint Capabilities: MULT5_ADTS

8.9.29.1

[PROFILES]

HEAAC_MULT5_ADTS

8.9.29.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS;
 AAC_ADTS_320;
 AAC_MULT5_ADTS;
 HEAAC_L2_ADTS;
 HEAAC_L2_ADTS_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	QVX65	
---	---	---------	-------	-----	-----	-------	--

8.9.30 HE-AAC audio format: Rendering Endpoint Capabilities: MULT5_ISO

8.9.30.1

[PROFILES]

HEAAC_MULT5_ISO

8.9.30.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also render content indicated by following profiles:

AAC_ADTS;
 AAC_ADTS_320;
 AAC_ISO;
 AAC_ISO_320;
 AAC_MULT5_ADTS;
 AAC_MULT5_ISO;
 HEAAC_L2_ADTS;
 HEAAC_L2_ADTS_320;
 HEAAC_L2_ISO;
 HEAAC_L2_ISO_320;
 HEAAC_MULT5_ADTS.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	86QRU	
---	---	---------	-------	-----	-----	-------	--

8.9.31 HE-AAC audio format: baseline(5): L4

8.9.31.1

[PROFILES]

HEAAC_L4

8.9.31.2

[GUIDELINE] Audio encoding shall match the provisions for Level 4 in the (MPEG-4) High Efficiency (HE) AAC profile as defined in ISO/IEC 14496-3:2005. The appropriate parameter in the file format shall be set to the profiles and level as listed below.

Profiles and level:

- HE-AAC Profile at Level 4.

Sampling rate (with and without SBR):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 1 440 kbit/s.

NOTE The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2001/AMD1:2003, maximum bitrate = $(6\ 144 / 1\ 024) \times \text{maximum sampling rate} \times \text{number of channels}$.

Content audio channel modes:

A bitstream conformant to this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2);
- Multichannel (3);
- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2005	D65YS
---	---	-----	-----	-----	-------------------------	-------

[COMMENT] The MPEG-4 High Efficiency AAC profile specified in ISO/IEC 14496-3:2005 includes the AAC LC and the SBR Audio Object Types.

8.9.32 HE-AAC audio format: Rendering Endpoint capabilities: L4**8.9.32.1****[PROFILES]**

HEAAC_L4

8.9.32.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also be able to render content indicated by following profiles:

- AAC_ADTS;
- AAC_ISO;
- AAC_ADTS_320;
- AAC_ISO_320;
- HEAAC_L2_ADTS;
- HEAAC_L2_ISO;
- HEAAC_L2_ADTS_320;
- HEAAC_L2_ISO_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	JJ49S	
---	---	---------	-------	-----	-----	-------	--

8.9.33 HE-AAC audio format: baseline: MPS

8.9.33.1

[PROFILES]

HEAAC_MPS

8.9.33.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the HEAAC_L2_ISO Profile as specified in 8.9.19.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	OPFTB	
---	---	-----	-----	-----	-----	-------	--

8.9.33.3

[GUIDELINE] Audio encoding shall match the provisions for one of the following levels in the MPS Profile as defined in ISO/IEC 23003-1:2007. The appropriate parameters in the file format shall be set to the profiles and level:

Profiles and levels:

- MPS Baseline Profile at Level 1;
- MPS Baseline Profile at Level 2;
- MPS Baseline Profile at Level 3;
- MPS Baseline Profile at Level 4.

Maximum sampling rate:

- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multichannel (3);

- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1);
- Multichannel (7.1).

Maximum bitrate (informative):

- 576 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	S597Z
---	---	-----	-----	-----	-----	-------

[COMMENT] HE-AAC is used for encoding of up to 2 core channels. MPS Levels 1 to 4 allow different numbers of input and output channels, and a different bandwidth of the residual signal decoding. The inherent bitstream level compatibility of MPEG Surround enables decoders of level 1, 2, 3 and 4 to decode bitstreams of all levels, though at a possibly slightly reduced quality due to the limitations of the decoder. This means that the highest possible reproduction quality is only ensured when the level of the decoder is equal to or larger than the level of the bitstream.

8.9.34 HE-AAC audio format: Rendering Endpoint capabilities: MPS

8.9.34.1

[PROFILES]

HEAAC_MPS

8.9.34.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also be able to render content indicated by following profiles:

AAC_ADTS;

AAC_ISO;

AAC_ADTS_320;

AAC_ISO_320;

HEAAC_L2_ADTS;

HEAAC_L2_ISO.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	49SRC
---	---	---------	-------	-----	-----	-------

8.9.35 HE-AAC audio format: MPS signaling

8.9.35.1

[PROFILES]

HEAAC_MPS

8.9.35.2

[GUIDELINE] The HE-AAC audio format shall follow the transport and signaling requirements for MPEG Surround in an MPEG-4 Audio/Systems Environment as specified in ISO/IEC 23003-1:2007, 7.2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 23003-1:2007	ZI97Q	N
---	---	-----	-----	-----	-------------------------	-------	---

8.9.36 HE-AACv2 audio format: baseline: L2

8.9.36.1

[PROFILES]

HEAACv2_L2

8.9.36.2

[GUIDELINE] Main characteristics of this HEAACv2_L2 audio stream are defined in ISO/IEC 14496-3:2005 and ISO/IEC 14496-3:2005/AMD2:2006.

Audio encoding shall match the provisions for this level in the (MPEG-4) High Efficiency AAC v2 Profile Level 2 as defined in ISO/IEC 14496-3:2005/AMD2:2006. The appropriate parameter in the file format shall be set to the profiles and level as listed below.

Profiles and level:

- High Efficiency AAC v2 Profile at Level 2.

AAC sampling rate (SBR present):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz.

AAC sampling rate (SBR not present):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Parametric Stereo (2) as defined in ISO/IEC 14496-3:2005.

Maximum bitrate (informative):

➤ 576 kbit/s.

NOTE The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2005 and ISO/IEC 14496-3:2005/AMD2:2006: maximum bitrate = (6 144/1 024) × maximum sampling rate × number of channels.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2005 ISO/IEC 14496-3:2005/A MD2:2006	5L956
---	---	-----	-----	-----	--	-------

[COMMENT]

- a) The MPEG-4 High Efficiency AAC v2 Profile specified in ISO/IEC 14496-3:2005/AMD2:2006 includes the AAC LC, the SBR, and the PS audio object types.
- b) The MPEG-4 High Efficiency AAC v2 Profile specified in ISO/IEC 14496-3:2005/AMD2:2006 has no Level 1.

8.9.37 HE-AACv2 audio format: Rendering Endpoint capabilities: L2

8.9.37.1

[PROFILES]

HEAACv2_L2

8.9.37.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also be able to render content indicated by following profiles:

AAC_ADTS;
 AAC_ISO;
 AAC_ADTS_320;
 AAC_ISO_320;
 HEAAC_L2_ADTS_320;
 HEAAC_L2_ISO_320;
 HEAAC_L2_ADTS;
 HEAAC_L2_ISO;
 HEAACv2_L2_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	39VJ6
---	---	---------	-------	-----	-----	-------

8.9.38 HE-AACv2 audio format: exception: L2_320

8.9.38.1

[PROFILES]

HEAACv2_L2_320

8.9.38.2

[GUIDELINE] Bitstreams compliant with this profile shall conform to all aspects of the HEAACv2_L2 profile, except as noted below.

Maximum bitrate (normative):

- 320 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	9P4NZ
---	---	-----	-----	-----	-----	-------

8.9.39 HE-AACv2 audio format: Rendering Endpoint capabilities: L2_320

8.9.39.1

[PROFILES]

HEAACv2_L2_320

8.9.39.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also be able to render content indicated by following profiles:

- AAC_ADTS_320;
- AAC_ISO_320;
- HEAAC_L2_ADTS_320;
- HEAAC_L2_ISO_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	9VJ6M
---	---	---------	-------	-----	-----	-------

8.9.40 HE-AACv2 audio format: maximum system bitrate: L2_320

8.9.40.1

[PROFILES]

HEAACv2_L2_320

8.9.40.2

[GUIDELINE] The maximum system bitrate, which is defined as the maximum of cumulative bitrate of streams in media data, shall be the following.

System bitrate:

- Up to 340 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	L956X
---	---	-----	-----	-----	-----	-------

8.9.41 HE-AACv2 audio format: exception: L2_128**8.9.41.1****[PROFILES]****HEAACv2_L2_128****8.9.41.2**

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the HEAACv2_L2 profile as specified in 8.9.36 except as indicated below.

Maximum bitrate (normative):

- 128 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	S9FKT	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This profile is a subset of the HEAACv2_L2 and HEAACv2_L2_320 profiles with a reduced bitrate of 128 kbit/s. Content that matches this profile and the HEAACv2_L2 profile or HEAACv2_L2_320 profile, or both (see 6.1.6.2), are urged to be exposed with this profile via an additional <res> element.

8.9.42 HE-AACv2 audio format: baseline: L4**8.9.42.1****[PROFILES]****HEAACv2_L4****8.9.42.2**

[GUIDELINE] Audio encoding shall match the provisions for Level 4 in the (MPEG-4) High Efficiency (HE) AAC v2 Profile as defined in ISO/IEC 14496-3:2005/AMD2:2006. The appropriate parameter in the file format shall be set to the profiles and level as listed below.

Profiles and level:

- HE-AAC Profile at Level 4 and HE-AAC v2 Profile at Level 2.

Sampling rate (with and without SBR):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 1 440 kbit/s.

Content audio channel modes:

A bitstream conformant with this Media Format Profile may contain the following formats:

- Mono (1);
- Stereo (2);
- Multichannel (3);
- Multichannel (4);
- Multichannel (5);
- Multichannel (5.1).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2005 ISO/IEC 14496-3:2005/A MD2:2006	QHVVYQ	
---	---	-----	-----	-----	--	--------	--

[COMMENT] The MPEG-4 High Efficiency AAC v2 Profile specified in ISO/IEC 14496-3:2005/AMD2:2006 includes the AAC LC, SBR and PS audio object types.

8.9.43 HE-AACv2 audio format: Rendering Endpoint capabilities: L4

8.9.43.1

[PROFILES]

HEAACv2_L4

8.9.43.2

[GUIDELINE] Rendering Endpoints compliant with this DLNA Media Format Profile shall also be able to render content indicated by following profiles:

- AAC_ADTS;
- AAC_ISO;
- AAC_ADTS_320;
- AAC_ISO_320;
- HEAAC_L2_ADTS;
- HEAAC_L2_ADTS_320;
- HEAAC_L2_ISO;
- HEAAC_L2_ISO_320;
- HEAACv2_L2;
- HEAACv2_L2_320.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	n/a	PFTBU	
---	---	---------	-------	-----	-----	-------	--

8.9.44 HE-AACv2 audio format: baseline: L6_ISO**8.9.44.1****[PROFILES]****HEAACv2_L6_ISO****8.9.44.2**

[GUIDELINE] Audio encoding shall match the provisions for Level 6 in the MPEG-4 High Efficiency (HE) AAC profile as defined in ISO/IEC 14496-3:2009 and ISO/IEC 14496-3:2009/AMD4:2013. The appropriate parameter in the file format shall be set to the profiles and level:

Profiles and level:

- HE AAC Profile @ Level 6.

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Multichannel (5.1);
- Multichannel (7.1).

Maximum bitrate (Informative):

- 2 016 kbps.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2009 ISO/IEC 14496-3:2009/A MD4:2013	2RGRT	N
---	---	-----	-----	-----	--	-------	---

[COMMENT] The maximum bitrate is defined by the following equation: maximum bitrate = $(6\ 144 / 1\ 024) \times$ maximum sampling rate \times number of channels.

8.9.45 HE-AACv2 audio format: Rendering Endpoint capabilities: L6_ISO**8.9.45.1**

[GUIDELINE] A Rendering Endpoints that conforms to this profile shall also be able to render content that conforms to the following profiles:

AAC_ISO;
 AAC_ISO_320;
 AAC_MULT5_ISO;
 AAC_L6_ISO;
 HEAAC_L2_ISO;
 HEAAC_L4;
 HEAACv2_L2;
 HEAACv2_L4.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	CID33	N
---	---	---------	-------	-----	-----	-------	---

8.9.46 AAC audio format: audio interchange formats: ADTS

8.9.46.1

[PROFILES]

AAC_ADTS

AAC_ADTS_320

AAC_ADTS_192

AAC_MULT5_ADTS

HEAAC_L2_ADTS

HEAAC_L2_ADTS_320

HEAAC_MULT5_ADTS

8.9.46.2

[GUIDELINE] AAC audio format encoding shall use the following audio interchange format:

ADTS.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-3:2001	736YP	
---	---	-----	-----	-----	-------------------------	-------	--

8.9.47 AAC audio format: audio interchange formats: MP4, 3GPP

8.9.47.1

[PROFILES]

AAC_ISO

AAC_ISO_320

AAC_ISO_192

AAC_MULT5_ISO

HEAAC_L2_ISO

HEAAC_L2_ISO_320

HEAAC_L2_ISO_128

HEAAC_MULT5_ISO

8.9.47.2

[GUIDELINE] AAC audio format encoding shall use one of the following audio interchange formats:

- MP4 file format;
- 3GPP file format.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 3GPP TS 26.244	7736Y	
---	---	-----	-----	-----	---	-------	--

8.9.48 AAC audio format: audio interchange formats: ADTS, MP4, 3GPP**8.9.48.1****[PROFILES]****AAC_MPS****MPEG2_AAC_MPS****HEAAC_L4****HEAAC_MPS****HEAACv2_L2****HEAACv2_L2_320****HEAACv2_L2_128****HEAACv2_L4****8.9.48.2**

[GUIDELINE] AAC audio format encoding shall use one of the following audio interchange formats:

- ADTS;
- MP4 file format;
- 3GPP file format.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-3:2001 ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 3GPP TS 26.244	22BSD	
---	---	-----	-----	-----	--	-------	--

8.9.49 AAC audio format: Rendering Endpoint Capabilities: ADTS**8.9.49.1****[PROFILES]****AAC_ADTS****AAC_ISO****AAC_ADTS_320****AAC_ISO_320****AAC_MULT5_ADTS****AAC_MULT5_ISO**

HEAAC_L2_ADTS
 HEAAC_L2_ADTS_320
 HEAAC_L2_ISO
 HEAAC_L2_ISO_320
 HEAAC_MULT5_ADTS
 HEAAC_MULT5_ISO
 MPEG2_AAC_MPS
 AAC_MPS
 HEAAC_L4
 HEAAC_MPS
 HEAACv2_L2
 HEAACv2_L2_320
 HEAACv2_L2_128
 HEAACv2_L4

8.9.49.2

[GUIDELINE] Rendering Endpoints compliant with these AAC audio formats profiles shall render the following audio interchange format:

➤ ADTS.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	ISO/IEC 14496-3:2001	535K7	A
---	---	---------	-------	-----	-------------------------	-------	---

8.9.50 AAC audio format: Rendering Endpoint Capabilities: MP4, 3GPP

8.9.50.1

[PROFILES]

AAC_ISO
 AAC_ISO_320
 AAC_MULT5_ISO
 HEAAC_L2_ISO
 HEAAC_L2_ISO_320
 HEAAC_MULT5_ISO
 MPEG2_AAC_MPS
 AAC_MPS
 HEAAC_L4
 HEAAC_MPS
 HEAACv2_L4
 HEAACv2_L2_320
 HEAACv2_L2

8.9.50.2

[GUIDELINE] Rendering Endpoints compliant with these AAC audio formats profiles shall render the following audio interchange formats:

- MP4 file format;
- 3GPP file format.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 3GPP TS 26.244	WQUA3	A
---	---	---------	-------	-----	---	-------	---

8.9.50.3**[PROFILES]****AAC_ADTS****AAC_ADTS_320****AAC_ADTS_192****AAC_MULT5_ADTS****HEAAC_L2_ADTS****HEAAC_L2_ADTS_320****HEAAC_MULT5_ADTS****8.9.50.4**

[GUIDELINE] Rendering Endpoints compliant with these AAC audio formats profiles should render the following audio interchange formats:

- MP4 file format;
- 3GPP file format.

[ATTRIBUTES]

S	R	DMP DMR	M-DMP	n/a	ISO/IEC 14496-3:2001 ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 3GPP TS 26.244	D75FA	A
---	---	---------	-------	-----	--	-------	---

8.9.51 AAC audio format: ADTS audio interchange format**8.9.51.1****[PROFILES]****AAC_ADTS****AAC_ADTS_320****AAC_ADTS_192****AAC_MULT5_ADTS****AAC_MPS****MPEG2_AAC_MPS****HEAAC_L2_ADTS**

HEAAC_L2_ADTS_320

HEAAC_MULT5_ADTS

HEAAC_L4

HEAAC_MPS

HEAACv2_L2

HEAACv2_L2_320

HEAACv2_L2_128

HEAACv2_L4

8.9.51.2

[GUIDELINE] For a bitstream compliant with the ADTS audio interchange format, the following constraints on `adts_fixed_header` and `adts_variable_header` shall be applied.

The constraints on `adts_fixed_header` are as follows.

ID:

0 (MPEG-4)

`protection_absent`:

0 (`crc_check` field is always present)

`profile_ObjectType`:

 ➤ 0x1.

`sampling_frequency_index`:

➤ 0xB (8 kHz);

➤ 0xA (11,025 kHz);

➤ 0x9 (12 kHz);

➤ 0x8 (16 kHz);

➤ 0x7 (22,05 kHz);

➤ 0x6 (24 kHz);

➤ 0x5 (32 kHz);

➤ 0x4 (44,1 kHz);

➤ 0x3 (48 kHz);

➤ 0x2 (64 kHz);

➤ 0x1 (88,2 kHz);

➤ 0x0 (96 kHz).

The constraints on `adts_variable_header` are as follows.

`adts_buffer_fullness`:

0x7FF (VBR)

`number_of_raw_data_blocks_in_frame`:

0 (One ADTS frame has only one `raw_data_block`).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2001	SDY3V	
---	---	-----	-----	-----	-------------------------	-------	--

[COMMENT] This guideline defines the list of sampling frequencies that can be used with the ADTS audio interchange format. An audio format that uses ADTS can restrict further the set of sampling frequencies. For example, Guideline 8.9.2.2 indicates that the AAC_ADTS profile uses only 9 of the 12 sampling frequencies defined in this guideline.

8.9.52 AAC audio format: MP4 audio interchange format**8.9.52.1****[PROFILES]**

AAC_ISO
AAC_ISO_320
AAC_ISO_192
AAC_MULT5_ISO
AAC_L6_ISO
AAC_MPS
MPEG2_AAC_MPS
HEAAC_L2_ISO
HEAAC_L2_ISO_320
HEAAC_L2_ISO_128
HEAAC_MULT5_ISO
HEAAC_L4
HEAAC_MPS
HEAACv2_L2
HEAACv2_L2_320
HEAACv2_L2_128
HEAACv2_L4
HEAACv2_L6_ISO

8.9.52.2

[GUIDELINE] MP4 system portion profile shall match the provision about MPEG-4 Part 14 with the constraints described below.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	A3HZN	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] The MP4 file format is based on ISO file format.

8.9.52.3

[GUIDELINE] One default audio track shall be present.

The default audio track shall contain Audio Elementary Stream for this Media Format Profile.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2004	FAYWK	
---	---	-----	-----	-----	--------------------------	-------	--

8.9.52.4

[GUIDELINE] The Rendering Endpoint shall be able to render at least the default audio track.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ISO/IEC 14496-12:2004	OZ2WS	A
---	---	---------	-------	-----	--------------------------	-------	---

[COMMENT] In addition to the default audio track, the Rendering Endpoint can support the rendering of additional tracks as defined in 8.9.52.7. The rendering of additional tracks is vendor dependent.

8.9.52.5

[GUIDELINE] The default audio track shall have the lowest track ID among the audio tracks contained in the content binary.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2004	8TSR7	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] This guideline defines a DLNA normative method to identify an audio track for default representation instead of using the Object Descriptor Box.

8.9.52.6

[GUIDELINE] For the default audio track, "Track_enabled" shall be set to the value of 1 in the "flags" field of Track Header Box of the track.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	ISO/IEC 14496-12:2004	Z2WST	
---	---	-----	-----	-----	--------------------------	-------	--

8.9.52.7

[GUIDELINE] A bitstream conformant with these profiles may contain additional tracks, other than the default audio tracks.

Additional tracks may not be compliant with the Elementary Streams for the Media Format Profile.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004	Q8TSR	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] Additional tracks can be BIFS track, optional audio tracks, optional video tracks, text track, and hint track.

8.9.52.8

[GUIDELINE] When a group of multiple tracks that contain alternate data for one another exists as part of a content binary, the value of the `alternate_group` field for each of these tracks should be the same non-zero value. When multiple instances of such groups exist, each group should have a distinct `alternate_group` value.

[ATTRIBUTES]

S	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004	E3YYZ	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] For example, this indicates that the multiple audio tracks are alternatives to each other (and are not intended to be mixed).

8.9.52.9

[GUIDELINE] A 'moov' box shall be positioned after 'ftyp' and before the first 'mdat'. If a 'moof' box is present, each 'moof' box shall be positioned before the corresponding 'mdat'.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	3YYZD	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] For streaming, moov is retrieved at first in consideration of streaming playback.

8.9.52.10

[GUIDELINE] Within a track media data chunks within a media data box 'mdat' shall be in decoding time order.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2004	7XN44	
---	---	-----	-----	-----	--------------------------	-------	--

8.9.52.11

[GUIDELINE] Audio tracks shall be organized as interleaved chunks. The duration of samples stored in a chunk shall not exceed 1 s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	AYWKW	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] A resource constrained system cannot process a big chunk.

8.9.52.12

[GUIDELINE] If the size of 'moov' box becomes bigger than 1 MB, the MPEG-4 movie shall be fragmented by using 'moof' box.

The size of 'moov' boxes shall be equal to or less than 1 MB.

The size of 'moof' boxes shall be equal to or less than 300 KiB.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	3HZNX
---	---	-----	-----	-----	--------------------------	-------

[COMMENT]

- a) A resource constrained system cannot process a big moov box in case of streaming.
- b) The 300 KiB value is calculated in the AV streaming guideline 9.3.19.1.11. This value is also adopted for audio.

8.9.52.13

[GUIDELINE] The sample size box ('stsz') shall be used. The compact sample size box ('stz2') shall not be used in MP4 files.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	DY3VB
---	---	-----	-----	-----	--------------------------	-------

8.9.52.14

[GUIDELINE] Only Media Data Box (mdat) is allowed to have size 1. Only the last Media Data Box (mdat) in the file is allowed to have size 0. Other boxes shall not have size 1.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	DZSES
---	---	-----	-----	-----	--------------------------	-------

8.9.53 AAC audio format: 3GPP audio interchange formats

8.9.53.1

[PROFILES]

- AAC_ISO
- AAC_ISO_320
- AAC_ISO_192
- AAC_MULT5_ISO
- AAC_MPS
- MPEG2_AAC_MPS
- HEAAC_L2_ISO
- HEAAC_L2_ISO_128

HEAAC_MULT5_ISO**HEAAC_L4****HEAAC_MPS****HEAACv2_L2****HEAACv2_L2_320****HEAACv2_L2_128****HEAACv2_L4****8.9.53.2**

[GUIDELINE] If 3GPP file format is selected as the audio interchange format, the following constraints shall be applied.

All the provisions in 8.9.52 apply.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	3GPP TS 26.244	8PBSF
---	---	-----	-----	-----	-------------------	-------

8.9.54 AAC audio format: MIME type definition: ADTS**8.9.54.1****[PROFILES]****AAC_ADTS****AAC_ADTS_320****AAC_ADTS_192****AAC_MULT5_ADTS****HEAAC_L2_ADTS****HEAAC_L2_ADTS_320****HEAAC_MULT5_ADTS****8.9.54.2**

[GUIDELINE] MIME type "audio/vnd.dlna.adts" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004	ZSESD
---	---	-----	-----	-----	--------------------------	-------

8.9.55 AAC audio format: MIME type definition: MP4, 3GPP**8.9.55.1****[PROFILES]****AAC_ISO****AAC_ISO_320****AAC_ISO_192****AAC_MULT5_ISO**

HEAAC_L2_ISO
 HEAAC_L2_ISO_320
 HEAAC_L2_ISO_128
 HEAAC_MULT5_ISO

8.9.55.2

[GUIDELINE] MIME type "audio/mp4" or "audio/3gpp" shall be used for these Media Format Profiles, depending on the audio interchange format used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004 3GPP TS 26.244	QRUUV
---	---	-----	-----	-----	---	-------

8.9.56 AAC audio format: MIME type definition: MP4, 3GPP, ADTS

8.9.56.1

[PROFILES]

AAC_MPS
 MPEG2_AAC_MPS
 HEAAC_L4
 HEAAC_MPS
 HEAACv2_L2
 HEAACv2_L2_320
 HEAACv2_L2_128
 HEAACv2_L4

8.9.56.2

[GUIDELINE] MIME type "audio/mp4", "audio/3gpp", or "audio/vnd.dlna.adts" shall be used for these Media Format Profiles, depending on the Audio Interchange Format used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004 3GPP TS 26.244	5B4NF
---	---	-----	-----	-----	---	-------

8.9.57 AAC audio format: MIME type definition, MP4

8.9.57.1

[PROFILES]

AAC_L6_ISO
 HEAACv2_L6_ISO

8.9.57.2

[GUIDELINE] MIME type "audio/mp4" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	G5YBB	N
---	---	-----	-----	-----	-----	-------	---

8.9.58 HE-AACv2 audio format: baseline: L2_MPS_DAB**8.9.58.1****[PROFILES]****HEAACv2_L2_MPS_DAB****8.9.58.2**

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the HEAACv2_L2 Profile as specified in 8.9.36, except as noted below.

Frame Length:

- 1 920 Samples when SBR present (HE-AAC);
- 960 Samples when SBR not present (AAC).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-3:2005 ISO/IEC 14496-3:2005/A MD2:2006	5YS59
---	---	-----	-----	-----	--	-------

8.9.58.3

[GUIDELINE] Audio encoding shall match the provisions as defined in DAB+ ETSI TS 102 563:2007 and for one of the following levels in the MPS Profile as defined in ISO/IEC 23003-1:2007. The appropriate parameters in the system portion shall be set to the profiles and level as listed below.

Profiles and levels:

- MPS Baseline Profile at Level 2;
- MPS Baseline Profile at Level 3.

Sampling rate (normative):

- 32 kHz;
- 48 kHz.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Parametric Stereo (2) as defined in ISO/IEC 14496-3:2005;
- Multichannel (5.1).

Maximum bitrate (normative):

- 192 kbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-3:2005/A MD2:2006 ISO/IEC 23003-1:2007 ETSI TS 102 563:2007	VYQ8R	
---	---	-----	-----	-----	---	-------	--

[COMMENT] HE-AACv2 is used for encoding of up to 2 core channels. MPS Levels 1 to 4 allow different numbers of input and output channels, and a different bandwidth of the residual signal decoding. The inherent bitstream level compatibility of MPEG Surround enables decoders of level 1, 2, 3 and 4 to decode bitstreams of all levels, though at a possibly slightly reduced quality due to the limitations of the decoder. This means that the highest possible reproduction quality is only ensured when the level of the decoder is equal to or larger than the level of the bitstream.

8.9.59 HE-AACv2 audio format: DAB audio super frame

8.9.59.1

[PROFILES]

HEAACv2_L2_MPS_DAB

8.9.59.2

[GUIDELINE] The system portion of this profile shall conform to ETSI TS 102 563:2007, 5.2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 102 563:2007	TBUKT	
---	---	-----	-----	-----	-------------------------	-------	--

8.9.60 HE-AACv2 audio format: MIME type definition:L2_MPS_DAB

8.9.60.1

[PROFILES]

HEAACv2_L2_MPS_DAB

8.9.60.2

[GUIDELINE] The MIME type "audio/x-dab" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	9SRC3	
---	---	-----	-----	-----	-----	-------	--

8.10 WMA profiling guidelines

8.10.1 General

Table 26 summarizes the Windows Media Audio (WMA) profiles and describes their relation with WMA specifications. Audio Media Class profile guidelines for WMA are listed in this subclause.

Table 26 – I List of WMA profiles for the Audio Media Class

Profile ID	Profile description	Relation to WMA specifications
WMABASE	Baseline Profile	WMA with bitrates up to 192 999 bit/s
WMAFULL	Full Profile	WMA with no bitrate constraints
WMAPRO	Professional Profile	WMA Professional version

8.10.2 WMA format**8.10.2.1****[PROFILES]****WMABASE****WMAFULL****WMAPRO****8.10.2.2**

[GUIDELINE] The WMA format shall be profiled according to the audio guidelines defined in this subclause. Table 26 summarizes the features of the WMA profiles defined for DLNA.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	WMA Specifications	UVITX
---	---	-----	-----	-----	--------------------	-------

8.10.3 WMA format: baseline profile**8.10.3.1****[PROFILES]****WMABASE****8.10.3.2**

[GUIDELINE] WMA audio format shall abide by the following characteristics.

The encoded audio matches the provisions for WMA defined in WMA Specifications with the following constraint:

Maximum bitrate of:

- 192 999 bit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	WMA Specifications	SESDO
---	---	-----	-----	-----	--------------------	-------

[COMMENT] WMA Baseline Profile defines support for stereo signals with bitrates up to 193 kbit/s and sampling rates up to 48 kHz.

8.10.4 WMA format: Full profile

8.10.4.1

[PROFILES]

WMAFULL

8.10.4.2

[GUIDELINE] WMA audio format shall abide by the following characteristics.

The encoded audio matches the provisions for WMA defined in WMA Specifications.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	WMA Specifications	PBSF9
---	---	-----	-----	-----	--------------------	-------

[COMMENT] WMA Full profile defines support for stereo signals with bitrates up to 385 kbit/s, sampling rates of up to 48 kHz.

8.10.5 WMA format: Professional profile

8.10.5.1

[PROFILES]

WMAPRO

8.10.5.2

[GUIDELINE] WMA audio format shall abide by the following characteristics.

The encoded audio matches the provisions for WMA Professional defined in WMA Specifications.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	WMA Specifications	4NFKR
---	---	-----	-----	-----	--------------------	-------

[COMMENT] WMA Professional profile defines support for up to 7.1 channels with bitrates up to 1,5 Mbit/s, and sampling rates up to 96 kHz.

8.10.6 WMA format: encapsulation file format for HTTP Media Transport

8.10.6.1

[PROFILES]

WMABASE

WMAFULL

WMAPRO

8.10.6.2

[GUIDELINE] A WMA audio format bitstream exchanged with the HTTP Media Transport shall use the ASF encapsulation interchange format defined in ASF:2004.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ASF:2004	TX7RD	
---	---	-----	-----	-----	----------	-------	--

[COMMENT] ASF is the file interchange format for WMA streams when content is exchanged over the HTTP Media Transport.

8.10.7 WMA format: ASF operational procedures**8.10.7.1****[PROFILES]****WMABASE****WMAFULL****WMAPRO****8.10.7.2**

[GUIDELINE] Rendering Endpoints that support ASF-encapsulated WMA audio format decoding over the HTTP Media Transport should follow the recommendations for ASF operational procedures described in ASF:2004.

[ATTRIBUTES]

S	C	DMP DMR	M-DMP	n/a	ASF:2004	ESDOU	A
---	---	---------	-------	-----	----------	-------	---

[COMMENT] Annex A describes seek operations with ASF files. It also describes buffering operations for the decoding of ASF files. These recommendations apply to the exchange of ASF encapsulated files using the HTTP Media Transport.

8.10.8 WMA format: minimal implementation**8.10.8.1****[PROFILES]****WMABASE****WMAFULL****WMAPRO****8.10.8.2**

[GUIDELINE] A Rendering Endpoint that supports the WMA Format shall be capable of decoding the Baseline profile (WMABASE) in addition to any other profile that it so chooses.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	WMA Specifications	BSF9I	
---	---	---------	-------	-----	--------------------	-------	--

[COMMENT] This guideline defines the minimal implementation expected from DLNA players that support WMA.

8.10.9 WMA format: MIME type definition

8.10.9.1

[PROFILES]

WMABASE

WMAFULL

WMAPRO

8.10.9.2

[GUIDELINE] MIME type "audio/x-ms-wma" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	WMA Specifications	VITX7
---	---	-----	-----	-----	--------------------	-------

8.11 WMA Lossless profiling guidelines

8.11.1 WMA Lossless: stereo profile

8.11.1.1

[PROFILES]

WMALSL

8.11.1.2

[GUIDELINE] WMA audio format shall abide by the following characteristics: The encoded audio matches the provisions for WMA Lossless defined in WMA Specifications.

Profiles and level:

- N1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	WMA Specifications	UR754
---	---	-----	-----	-----	--------------------	-------

8.11.2 WMA Lossless: multichannel profile

8.11.2.1

[PROFILES]

WMALSL_MULT5

8.11.2.2

[GUIDELINE] WMA audio format shall abide by the following characteristics: the encoded audio matches the provisions for WMA Lossless defined in WMA Specifications.

Profiles and level:

- N2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	WMA Specifications	FKTSV	
---	---	-----	-----	-----	--------------------	-------	--

8.11.3 WMA Lossless: MIME type definition

8.11.3.1

[PROFILES]

WMALSL

WMALSL_MULT5

8.11.3.2

[GUIDELINE] MIME type "audio/x-ms-wma" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	WMA Specifications	6IXB5	
---	---	-----	-----	-----	--------------------	-------	--

9 AV Media Class Media Format Profiles

9.1 General

This clause specifies the set of format profiles applicable to the AV Media Class. Tables in this section specify encoding attributes of these profiles. Progressive scan formats are defined by a frame rate whereas interlaced formats are defined using a field rate. Frame and field rates are specified by a numeric value appended with either the letter "i" or the letter "p", designating interlaced and progressive forms respectively. The field rate of interlaced formats is double the frame rate for that format. So, for example, a format specified as 59,94i defines an interlaced format with a field rate of 59,94 and a frame rate of 29,97 frames per second (fps). By comparison, a Media Format specified as 29,97p is a progressive scan format with a frame rate of 29,97 fps.

According to the requirements defined in Table 21, particular profiles of the MPEG-2 format become mandatory for HND and MHD devices depending on the applicable region. Table 21 currently defines four regions. Other regions might be incorporated in the future.

A number of the guidelines in this clause refer to the TV systems PAL and NTSC. These guidelines do not refer to the analogue part of the respective TV system, but only to the related relevant digital encoding characteristics such as frame rates, frame resolutions, etc. For example:

- a) "TV System PAL" in the DLNA context refers to 25 Hz video frame rate.
- b) "TV System NTSC" in the DLNA context refers to 29,97 Hz video frame rate.

In addition to MPEG-2 profiles, this clause also defines profiles for MPEG-4 Part 10 (also known as AVC or H.264), MPEG-H Part 2 (also known as HEVC or H.265), Windows Media Video Version 9 (WMV9), MPEG-2 video (specifically supporting HD frame-compatible 3D video), MPEG-4 Part 10, including support for HD frame-compatible 3D video, profile that specifies use

of the MVC extension to MPEG-4 Part 10 to support full resolution HD video with a 2D compatible component and profiles for MPEG-4 Part 10, for use with the DASH_MPD Profile.

9.2 MPEG-2 profiling guidelines

9.2.1 Summary of MPEG-2 AV profiles

Table 27 provides a summary of the MPEG-2 AV Profiles.

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Table 27 – Summary of MPEG-2 profiles for the AV Media Class

DLNA Profile ID	video portion profile					audio portion profile					system portion profile						
	MP @ LL	MP @ ML	MP @ HL	MP @ H-14	AC3	DTS	DTS HD	LPCM	MPEG1_L2	MPEG-2 AAC	MPEG-4 AAC	ITU BO 1516 B	ITU BO 1516 B TTS	MPEG-2 PS	MPEG2-TS	MPEG2-TS_T	MPEG2-TS_ISO
MPEG_PS_NTSC		X			X			X	X					X			
MPEG_PS_PAL		X			X			X	X					X			
MPEG_PS_SD_DTS		X				X							X				
MPEG_TS_SD_NA		X			X										X		
MPEG_TS_SD_NA_T		X			X											X	
MPEG_TS_SD_NA_ISO		X			X												X
MPEG_TS_HD_NA			X		X										X		
MPEG_TS_HD_NA_T			X		X											X	
MPEG_TS_HD_NA_ISO			X		X												X
MPEG_TS_NA_ISO		X	X		X												X
MPEG_TS_NA_3DFC_ISO		X	X		X												X
MPEG_TS_SD_KO		X			X										X		
MPEG_TS_SD_KO_T		X			X											X	
MPEG_TS_SD_KO_ISO		X			X												X
MPEG_TS_HD_KO			X		X										X		
MPEG_TS_HD_KO_T			X		X											X	
MPEG_TS_HD_KO_ISO			X		X												X
MPEG_TS_SD_EU		X			X				X						X		
MPEG_TS_SD_EU_T		X			X				X							X	
MPEG_TS_SD_EU_ISO		X			X				X								X
MPEG_TS_SD_EU_DTS_ISO		X				X											X
MPEG_TS_JP_T			X							X						X	
MPEG_TS_SD_DTS_ISO		X				X											X
MPEG_TS_HD_DTS_ISO			X			X											X
MPEG_TS_HD_DTS HD_T		X	X			X	X									X	
MPEG_DIRECTV_SD_MPEG1_L2		X							X			X					
MPEG_DIRECTV_SD_MPEG1_L2_T		X							X			X					

9.2.2 General format guidelines for MPEG-2 Programme Streams

9.2.2.1 MPEG-2 AV format: Programme Stream profiling

9.2.2.1.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.2.1.2

[GUIDELINE] The Programme Streams (PS) shall be profiled according to the video format-specific guidelines 9.2.2.2 through 9.2.3.3 and at least one of the following audio profile parameters: LPCM 9.2.3.4, AC-3 9.2.3.5, and MPEG Audio Layer 9.2.3.6.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/52:2012 ISO/IEC 11172-3 ISO/IEC 13818-3 ISO/IEC 13818-1:2000 ISO/IEC 13818-2	FKRRV	
---	---	-----	-----	-----	---	-------	--

9.2.2.1.3

[GUIDELINE] Rendering Endpoints shall render the MPEG-2 Programme Stream (PS) profiled according to all video format-specific Profile Parameter Sets listed in 9.2.2.2 through 9.2.3.3 and all audio portion profiles (i.e., LPCM, MPEG-1/2-Layer 2, and AC-3) specified in the entries 9.2.3.4 through 9.2.3.6.

The following are the exceptions to the rules.

TV system (NTSC / PAL)

Either NTSC or PAL may be supported.

MPEG-2 L2 extension stream

A bitstream conformant to these guidelines may contain multichannel audio information in the extension stream.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	ATSC Standard A/52:2012 ISO/IEC 11172-3 ISO/IEC 13818-3 ISO/IEC 13818-1:2000 ISO/IEC 13818-2	7RDA5	A
---	---	---------	-------	-----	---	-------	---

[COMMENT] The number of audio output channels for Rendering Endpoints is specified in guideline 6.1.8.

9.2.2.2 MPEG-2 AV format: Programme Stream profiling**9.2.2.2.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL****9.2.2.2.2**

[GUIDELINE] The PS bit stream shall consist of a sequence of MPEG-2 Packs, as defined in ISO/IEC 13818-1:2000, each of which may carry audio, video, or other data.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-1:2000	SF9IT	
---	---	-----	-----	-----	-------------------------	-------	--

9.2.2.2.3

[GUIDELINE] The PS bit stream shall start with a PacketHeader followed by a ProgramStreamMap.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-1:2000	FW38M	N
---	---	-----	-----	-----	-------------------------	-------	---

9.2.2.3 MPEG-2 AV format: PS Stream and Substream IDs**9.2.2.3.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL****9.2.2.3.2**

[GUIDELINE] A bitstream compliant with these profiles shall use the stream_id and sub_stream_id field to identify video and audio Elementary Streams as defined in this standard according to DVD Specifications:2001, and not in the Programme Stream Map (PSM) or Directory structures of ISO/IEC 13818-1:2000.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	ISO/IEC 13818-1:2000 DVD Specifications:2 001	DOUDJ	
---	---	-----	-----	-----	---	-------	--

9.2.2.4 MPEG-2 AV format: Programme Stream structure: data packs**9.2.2.4.1****[PROFILES]**

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.2.4.2

[GUIDELINE] A bitstream compliant with these profiles may have RDI and sub-picture packs in agreement to the provisions defined in DVD Specifications:2001.

[ATTRIBUTES]

O	C	n/a	n/a	n/a	DVD Specifications:2001	RRV63	
---	---	-----	-----	-----	-------------------------	-------	--

[COMMENT] This entry makes navigation and sub-picture packs optional. They will not be generated for example in cases of TS to PS conversions.

9.2.2.5 MPEG-2 AV format: Programme Stream structure: private packs

9.2.2.5.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.2.5.2

[GUIDELINE] A bitstream compliant with these profiles may contain additional private packs recognized by the use of private stream_id and/or substream_id values.

[ATTRIBUTES]

O	C	n/a	n/a	n/a	ISO/IEC 13818-11 DVD Specifications:2001	KRRV6	
---	---	-----	-----	-----	--	-------	--

[COMMENT] This entry clarifies that proprietary information can exist in the stream. It recommends the preferred MPEG-2 method to add private information without overloading stream_id values.

9.2.2.5.3

[GUIDELINE] A bitstream compliant with these profiles should contain private packs that use the stream_id extensions defined in ISO/IEC 13818-11 to avoid potential conflicts with future usage of stream_id and substream_id fields.

[ATTRIBUTES]

S	C	n/a	n/a	n/a	ISO/IEC 13818-11 DVD Specifications:2001	OUJL	
---	---	-----	-----	-----	--	------	--

9.2.2.6 MPEG-2 AV format: mandatory Transport Alignment element**9.2.2.6.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL****9.2.2.6.2**

[GUIDELINE] The Transport Alignment Position for bitstreams conformant to these profiles shall be the MPEG-2 pack boundary.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	ISO/IEC 13818-1:2000 DVD Specifications:2 001 IETF RFC 1945	91T8C
---	---	-----	-----	-----	--	-------

[COMMENT] This entry clarifies the Transport Stream alignment of MPEG-2 Programme Streams.

9.2.2.7 MPEG-2 AV format: recommended Decoder Friendly Alignment Position**9.2.2.7.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL****9.2.2.7.2**

[GUIDELINE] The Decoder Friendly Alignment Element for bitstreams conformant with these profiles should be the MPEG-2 GOP boundary.

[ATTRIBUTES]

S	L	n/a	n/a	n/a	n/a	UDJLP
---	---	-----	-----	-----	-----	-------

[COMMENT] This entry clarifies the transport alignment of MPEG-2 Programme Streams when a Time Seek is performed.

9.2.2.8 MPEG-2 AV format: PS best effort source streams**9.2.2.8.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL**

9.2.2.8.2

[GUIDELINE] Elementary Streams at the Serving Endpoint prior to transmission shall conform to the constraints imposed by the Buffer Reference Models defined in DVD Specifications:2001.

[ATTRIBUTES]

M	C	DMS	M-DMS	n/a	DVD Specifications:2001	IT8C6	
---	---	-----	-------	-----	-------------------------	-------	--

[COMMENT] The network might introduce jitter due to best effort traffic characteristics when sending packets across the network.

9.2.2.9 MPEG-2 AV format: PS best effort destination streams

9.2.2.9.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.2.9.2

[GUIDELINE] On arrival, Rendering Endpoints may reconstruct the original programme multiplex typically using buffers that compensate for network jitter, delays, etc. The rate for the programme multiplex shall be obtained from the program_mux_rate field of a pack header. The reconstruction process is implementation-dependent.

[ATTRIBUTES]

M	C	DMP DMR	M-DMP	n/a	DVD Specifications:2001	RDA5X	A
---	---	---------	-------	-----	-------------------------	-------	---

[COMMENT] This statement says that Rendering Endpoints will rely on the information from one particular field to reconstruct the programme mux before decoding.

9.2.2.10 MPEG-2 AV format: MIME type definition

9.2.2.10.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

MPEG_PS_SD_DTS

9.2.2.10.2

[GUIDELINE] MIME type "video/mpeg" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	A	n/a	n/a	n/a		V6344	
---	---	-----	-----	-----	--	-------	--

9.2.2.11 MPEG-2 AV format: usage of Profile IDs**9.2.2.11.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL****9.2.2.11.2****[GUIDELINE]** The following Profile ID values shall be used for this Media Format.

If the TV System is NTSC:

DLNA profile=MPEG_PS_NTSC.

If the TV System is PAL:

DLNA profile=MPEG_PS_PAL.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	RV634
---	---	-----	-----	-----	-------

[COMMENT] If the TV system supports both NTSC and PAL, it can be exposed using both MPEG_PS_NTSC and MPEG_PS_PAL DLNA profiles.**9.2.3 Format compression-level guidelines for MPEG-2 Programme Streams****9.2.3.1 MPEG-2 AV format: system stream specification****9.2.3.1.1****[PROFILES]****MPEG_PS_NTSC****MPEG_PS_PAL****9.2.3.1.2****[GUIDELINE]** Main characteristics of MPEG-2 system stream are the following.

System:

Programme Stream.

Number of video streams:

1 video stream only.

Number of audio stream:

Up to 2 audio streams.

System bitrate:

Up to 10,08 Mbit/s.

Pack size:

Shall be 2 048 B per each Pack.

Pack Header:

Shall match the provisions defined in Table 5.3.1-2: Pack Header in DVD Specifications:2001.

Audio Pack:

Audio Pack Structure shall match the provisions in Figure 5.3.3-1: Structure of Audio Pack in DVD Specifications:2001.

Video Pack:

Video Pack Structure shall match the provisions in Figure 5.3.2-1: Structure of Video Pack in DVD Specifications:2001.

System header:

Shall match the provisions defined in Table 5.3.2-1: System header in DVD Specifications:2001.

Content length:

Shall not exceed $1/90\,000 \times 4\,294\,967\,295$ s if the content has no corresponding IFO file.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-1:2000 DVD Specifications:2 001	DJLPY
---	---	-----	-----	-----	---	-------

[COMMENT]

- a) Stuffing up to 2 048 B pack size is done at the packet header or with padding packet.
 $2^{32}-1 = 4\,294\,967\,295$.
- b) If the content has a corresponding IFO file, the content length limitation corresponds to that in the IFO file.

9.2.3.2 MPEG-2 AV format: optional system stream elements

9.2.3.2.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.2.2

[GUIDELINE] A bitstream conformant to these Media Format Profiles may contain the following characteristics.

Programme End Code:

Programme end code may be included at the end of stream.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	n/a	T8C6E
---	---	-----	-----	-----	-----	-------

9.2.3.3 MPEG-2 AV format: video portion profile

9.2.3.3.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.3.2

[GUIDELINE] Video Elementary Stream shall match the provisions about MPEG-2 Video Stream in DVD Specifications:2001, 1.2, 5.1, 5.2.1, 5.3.2 and 5.5.1.2. Main characteristics of MPEG-2 video stream are:

Profile:

MP@ML.

Stream ID in MPEG-2 System:

0xE0. (defined in Table 5.1-3 of DVD Specifications:2001: stream_id).

Sequence_header:

Sequence_header followed by GOP_header shall be set at the beginning of video data in video pack at the intervals between 0,4 s and 1,0 s (defined in 5.2.1 Movie VOB in DVD Specifications:2001).

Video bitrate:

CBR: less than or equal to 9,80 Mbit/s;

VBR: maximum bitrate less than or equal to 9,80 Mbit/s;

(defined in Table 5.5.1.2-1: Constraints on MPEG-2 video in DVD Specifications:2001).

TV System

NTSC or PAL with the following characteristics as shown in Table 28.

Table 28 – MPEG-2 AV format resolutions

	NTSC	PAL
Resolution	720 × 480 704 × 480 544 × 480 480 × 480 352 × 480 352 × 240	720 × 576 704 × 576 544 × 576 480 × 576 352 × 576 352 × 288
	The resolution may be changed during a single content streaming session. When this happens, and there is no associated IFO file, then the sequence_end_code shall be set to the boundary of resolution change.	
Frame rate	29,97 Hz	25 Hz
Number of Pictures in GOP	36 display fields or fewer 18 frames or fewer (progressive)	30 display fields or fewer 15 frames or fewer (progressive)

(These constraints are defined in Table 5.5.1.2-1: Constraints on MPEG-2 Video in DVD Specifications:2001.)

Display aspect ratio:

4:3;

16:9.

Aspect ratio may be changed. When this happens, and there is no associated IFO file, then the sequence_end_code shall be set to the boundary of aspect ratio change.

(Defined in 5.5.1.2 MPEG-2 video data for one GOP and Table C-2: Relation between Presentation Data of Video and the Player in DVD Specifications:2001.)

"low_delay"

0b i.e. "low_delay" sequences are not permitted. (Defined in Table 5.5.1.2-1: Constraints on MPEG-2 video in DVD Specifications:2001.)

PTS, DTS in Video Packet

PTS and DTS are mandatory in each Video Pack containing the first byte of the picture start code of any MPEG-2 I-picture encoded as a frame picture or any first MPEG-2 I-picture of a pair of two encoded field pictures.

PTS ISO/IEC 11172-2 and DTS ISO/IEC 11172-2 shall be set to zero. (Defined in Table 5.3.2-2: Video Packet in DVD Specifications:2001.)

Video Packet Header

Video Packet Header shall match the provisions defined in Table 5.3.2-2: Video packet in DVD Specifications:2001.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 DVD Specifications:2001	DA5X9	E
---	---	-----	-----	-----	--	-------	---

[COMMENT] Example, PTS ISO/IEC 11172-2 means the specific bit (i.e., MSB in this case) of the PTS field.

9.2.3.4 MPEG-2 AV format: audio portion profiling: LPCM

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

[GUIDELINE] LPCM Audio stream shall match the provisions about LPCM Audio in 1.2 General Specifications of Presentation Data, 5.1 Definition of VOB, 5.3.3 Audio Pack and 5.5.2.1 Linear PCM audio in DVD Specifications:2001. The main characteristics of LPCM audio stream are:

Scheme to combine the LPCM Elementary Stream to MPEG-2 Programme Stream:

LPCM Audio bit stream is multiplexed as private_stream_1.

Stream_id for main audio is 0xBD (indicating to the private_stream_1).

Sub_stream_id to distinguish the LPCM audio stream is 0b1010_000*. (The first byte in data area of each packet is assigned as sub_stream_id).

0b1010_000*: * corresponds to audio stream number. *=0 for main language. *=1 corresponds to auxiliary language.

(Defined in 5.1 Definition of VOB in DVD Specifications:2001.)

Sampling rate:

- 48 kHz (defined in Table 5.5.2.1-1 Linear PCM coding basics in DVD Specifications:2001.)

Content audio channel modes:

A bitstream conformant to these Media Format Profiles may contain the following formats

- Mono (1/0);
- Stereo (2/0);
- Dual Monaural (1/0 + 1/0).

(These are defined in Table 5.5.2.1-2: Linear PCM data size in a packet in DVD Specifications:2001.)

Quantization

16 bit (defined in Table 5.5.2.1-1 Linear PCM coding basics in DVD Specifications:2001.)

Audio bitrate

1,536 Mbit/s per one stream (2 channels);

768 kbit/s per stream (mono).

Emphasis

May be applied (zero point: 50 µs, Pole: 15 µs) (defined in Table 5.5.2.1-1 Linear PCM coding basics in DVD Specifications:2001.)

Channel assignment

In the stereo presentation mode, the descriptions of channels ACH0 and ACH1 correspond to Left channel (L-ch) and Right channel (R-ch) respectively. (defined in F5.5.2.1 Linear PCM audio in DVD Specifications:2001).

PTS in Audio Packet

PTS shall be described in every Audio packet in which the first sample of audio frame is included.

PTS ISO/IEC 11172-2 shall be set to zero (defined in Table 5.3.3-1 Audio Packet of Linear PCM in DVD Specifications:2001).

Packet header

Packet header shall match the provisions defined in Table 5.3.3-1: Audio packet of Linear PCM in DVD Specifications:2001.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	DVD Specifications:2001	JLPYM
---	---	-----	-----	-----	-------------------------	-------

9.2.3.5 MPEG-2 AV format: audio portion profiling: AC-3

9.2.3.5.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.5.2

[GUIDELINE] AC-3 AUDIO STREAM SHALL MATCH THE PROVISIONS OF AC-3 AUDIO IN 1.2 GENERAL Specifications of Presentation Data, 5.1 Definition of VOB, 5.3.3 Audio Pack and 5.5.2.2 AC-3 audio in DVD Specifications:2001.

Main characteristics of the AC-3 audio stream are:

Scheme to combine the AC-3 Elementary Stream to MPEG-2 Programme Stream.

AC-3 Audio bit stream is multiplexed as private_stream_1.

Stream_id for main audio is 0xBD (indicating the private_stream_1).

Sub_stream_id to distinguish the AC-3 audio stream is 0b1000_000*. (The first byte in data area of each packet is assigned as sub_stream_id).

0b1000_000*: * corresponds to audio stream number. *=0 for main language. *=1 corresponds to auxiliary language.

(Defined in 5.1 Definition of VOB in DVD Specifications:2001.)

Sampling rate

48 kHz (defined in Table 5.5.2.2-1: Restricted Items for AC-3 of audio in DVD Specifications:2001).

Content audio channel modes:

A bitstream conformant to these Media Format Profiles may contain the following formats:

- Mono (1/0);
- Dual Monaural (1/0 + 1/0);
- Stereo (2/0);
- Multichannel (3/0);
- Multichannel (2/1);
- Multichannel (3/1);
- Multichannel (2/2);
- Multichannel (3/2).

Changing audio channels among mono, dual-mono and stereo is allowed, (defined in Table 5.5.2.2-1: Restricted Items for AC-3 of audio and Table C-4: Relation between Presentation Data of Audio and the Player in DVD Specifications:2001).

Audio bitrate

64 kbit/s to 448 kbit/s (defined in Table 5.5.2.2-1: Restricted Items for AC-3 of audio in DVD Specifications:2001).

PTS in Audio Packet

PTS shall be described in every audio packet in which the first sample of audio frame is included.

PTS ISO/IEC 11172-2 shall be set to zero (defined in Table 5.3.3-2 Audio Packet of AC-3 in DVD Specifications:2001).

Packet Header

Packet Header shall match the provisions defined in Table 5.3.3-2: Audio packet of AC-3 in DVD Specifications:2001.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	ATSC Standard A/52:2012 DVD Specifications:2001	8C6E8
---	---	-----	-----	-----	--	-------

9.2.3.6 MPEG-2 AV format: audio portion profiling: MPEG-1 L2, MPEG-2 L2

9.2.3.6.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.6.2

[GUIDELINE] MPEG-1 and MPEG-2 Audio Layer 2 Stream shall match the provisions about MPEG Audio in 1.2 General Specifications of Presentation Data, 5.1 Definition of VOB, 5.3.3 Audio Pack and 5.5.2.3 MPEG audio in DVD Specifications:2001. Main characteristics of MPEG Audio Layer 2 stream are:

Stream ID in MPEG-2 System

0b1100_000* for main audio stream

0b1101_000* for MPEG-2 extension audio stream

The bit identified by * corresponds to audio stream number with values: 0 (main language), or 1 (auxiliary language), as defined in Table 5.3.3-3 of DVD Specifications:2001 (Audio packet of MPEG audio).

Sampling rate

48 kHz. (Defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001.)

Protection

CRC check always on. (Defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001.)

If bad (invalid) CRC is detected, DMP can mute the audio or deploy implementation-dependent error-concealment techniques.

Content audio channel modes:

A bitstream conformant to these Media Format Profiles may contain the following formats:

- Mono (1/0);
- Dual Monaural (1/0 + 1/0);
- Stereo (2/0).

Within a bitstream, the audio channel modes may change (defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio and Table C-4: Relation between Presentation Data of Audio and the Player in DVD Specifications:2001).

Audio bitrate:

- MPEG-1 Audio Layer 2,
 - 1 channel (mono):
 - from 64 kbit/s to 192 kbit/s.
 - 2 channel (stereo, dual mono):
 - from 64 kbit/s to 384 kbit/s.
- MPEG-2 Audio Layer 2.

Main stream:

- 1 channel (mono):
 - from 64 kbit/s to 192 kbit/s.
- 2 channel (stereo, dual mono):
 - from 64 kbit/s to 384 kbit/s.

Extension stream:

Up to 528 kbit/s.

(defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001).

Emphasis:

Always no emphasis (defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001).

Private bit

0 (defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001).

Number of multilingual channels

0 (defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001).

mc_prediction_on

0 (use of prediction excluded). (defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001).

Number of bits reserved for "dynamic_range_control" in ancillary data

16 (defined in Table 5.5.2.3-1: Restricted Items for MPEG coding of audio in DVD Specifications:2001).

PTS in audio packet

PTS shall be described in every audio packet in which the first sample of audio frame is included.

PTS ISO/IEC 11172-2 shall be set to zero (defined in Table 5.3.3-3 Audio Packet of MPEG Audio in DVD Specifications:2001).

Audio Packet Header

Packet Header shall match the provisions defined in Table 5.3.3-3: Audio packet of MPEG Audio in DVD Specifications:2001.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	ISO/IEC 13818-3 ISO/IEC 11172-3 DVD Specifications:2001	A5X9F
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9.2.3.7 MPEG-2 AV format: IFO file format

9.2.3.7.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.7.2

[GUIDELINE] If the IFO file is used, then the format of an IFO file shall conform to the DVD-VR IFO format except for the following provision.

An IFO file shall include the information only for one piece of the corresponding to this IFO file DLNA PS-formatted content.

The maximum size of the IFO file shall not exceed 512 KiB.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	DVD Specifications:2001	6344H	
---	---	-----	-----	-----	-------------------------	-------	--

[COMMENT] For media management-related guideline entry, see IEC 62481-1-1:2017 guideline 10.1.4.8 (MM DIDL-Lite AudioItem album art).

9.2.3.8 MPEG-2 AV format: field values in IFO file and their treatment

9.2.3.8.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.8.2

[GUIDELINE] An IFO file shall conform to the field values specified in Table B.1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	DVD Specifications:2001	LPYM3	
---	---	-----	-----	-----	-------------------------	-------	--

[COMMENT] "Correct value" in DVD Specifications:2001 means the value is specified according to the DVD-VR specifications. "Ignorable" in Annex B means that Rendering Endpoints don't care about the value in the field.

9.2.3.8.3

[GUIDELINE] While interpreting the information in the IFO file, Rendering Endpoints shall treat the fields according to Annex B. If the treatment in

Table B.2 is "SHALL check", then Rendering Endpoints shall check the value and treat it according to what is specified in its comments column.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	DVD Specifications:2001	C6E86	A
---	---	---------	-------	-----	-------------------------	-------	---

9.2.3.8.4

[GUIDELINE] If the treatment in Annex B is "SHOULD use", then Rendering Endpoint should use the information specified in the field to handle the SCR/PTS discontinuous PS stream.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	DVD Specifications:2001	5X9FQ	A
---	---	---------	-------	-----	-------------------------	-------	---

9.2.3.9 MPEG-2 AV format: IFO file MIME type

9.2.3.9.1

[PROFILES]

MPEG_PS_NTSC

MPEG_PS_PAL

9.2.3.9.2

[GUIDELINE] The following MIME type shall be used in indicating the IFO file resource application/octet-stream.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	DVD Specifications: 2001	344H9
---	---	-----	-------	-----	--------------------------	-------

9.2.4 MPEG-2 AV format: system portion profile: PS_SD_DTS

9.2.4.1

[PROFILES]

MPEG_PS_SD_DTS

9.2.4.2

[GUIDELINE] Main characteristics of this MPEG_PS_SD stream are defined in DVD Forum. Main characteristics of MPEG-2 system stream are

System:

System Stream is MPEG-2 Programme Stream.

Number of programs:

1.

System bitrate:

Up to 10,08 Mbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	DVD Forum	ZQQN9
---	---	-----	-----	-----	-----------	-------

9.2.5 MPEG-2 AV format: video portion profile: PS_SD_DTS

9.2.5.1

[PROFILES]

MPEG_PS_SD_DTS

9.2.5.2

[GUIDELINE] Main characteristics of video shall be conformant to DVD Forum. The main characteristics of MPEG-2 video streams are:

Profiles and level:

- Main Profile at Main Level.

Table 29 specifies the video encoding parameters for MPEG-2 Video (PS_SD).

Table 29 – MPEG-2 video encoding parameters (PS_SD)

Resolution	Aspect ratio	Field (interlaced) or Frame (progressive) rate
720 × 576	4:3, 16:9	25p/50i
720 × 480	4:3, 16:9	29,97p/59,94i
704 × 576	4:3	25p/50i
704 × 480	4:3	29,97p/59,94i
352 × 576	4:3	25p/50i
352 × 480	4:3	29,97p/59,94i
352 × 288	4:3	25p
352 × 240	4:3	29,97p

[ATTRIBUTES]

M	R	n/a	n/a	n/a	DVD Forum	XYQYS	
---	---	-----	-----	-----	-----------	-------	--

9.2.6 MPEG-2 AV format: audio portion profile: PS_SD_DTS

9.2.6.1

[PROFILES]

MPEG_PS_SD_DTS

9.2.6.2

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the DTS Digital Surround audio format as specified in 8.2.1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	N94E9	
---	---	-----	-----	-----	-----	-------	--

9.2.7 General format guidelines for MPEG-2 Transport Streams

9.2.7.1 MPEG-2 AV format: MPEG-2 TS packet format

9.2.7.1.1

[PROFILES]

- MPEG_TS_SD_NA
- MPEG_TS_SD_NA_T
- MPEG_TS_SD_NA_ISO
- MPEG_TS_HD_NA
- MPEG_TS_HD_NA_T
- MPEG_TS_HD_NA_ISO
- MPEG_TS_NA_ISO
- MPEG_TS_NA_3DFC_ISO
- MPEG_TS_SD_KO
- MPEG_TS_SD_KO_T
- MPEG_TS_SD_KO_ISO
- MPEG_TS_HD_KO
- MPEG_TS_HD_KO_T
- MPEG_TS_HD_KO_ISO
- MPEG_TS_SD_EU
- MPEG_TS_SD_EU_T
- MPEG_TS_SD_EU_ISO
- MPEG_TS_SD_EU_DTS_ISO
- MPEG_TS_JP_T
- MPEG_TS_SD_DTS_ISO
- MPEG_TS_HD_DTS_ISO
- MPEG_TS_HD_DTS_T

9.2.7.1.2

[GUIDELINE] DLNA defines three MPEG-2 TS packet formats as described below:

192-B DLNA Transport Packet with a valid 4-B timestamp field and a 188-B MPEG-2 Transport Stream Packet;

192-B DLNA Transport Packet with zeros in a 4-B timestamp field and a 188-B MPEG-2 Transport Stream Packet;

188-B DLNA Transport Packet without a 4-B timestamp field and a 188-B MPEG-2 Transport Stream Packet.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	PYM37
---	---	-----	-----	-----	-----	-------

9.2.7.2 MPEG-2 AV format: MIME type definition for 192 B Transport Packets**9.2.7.2.1****[PROFILES]**

MPEG_TS_SD_NA
 MPEG_TS_SD_NA_T
 MPEG_TS_HD_NA
 MPEG_TS_HD_NA_T
 MPEG_TS_SD_KO
 MPEG_TS_SD_KO_T
 MPEG_TS_HD_KO
 MPEG_TS_HD_KO_T
 MPEG_TS_SD_EU
 MPEG_TS_SD_EU_T
 MPEG_TS_JP_T
 MPEG_TS_HD_DTS_T

9.2.7.2.2

[GUIDELINE] The MIME type "video/vnd.dlna.mpeg-tts" shall be used for Media Format Profiles which use a 192-B DLNA Transport Packet format.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	XB524
---	---	-----	-----	-----	-----	-------

[COMMENT] The MIME type defined in this guideline has to be used when exchanging content that conforms to the MPEG_TS_JP_T profile over DLNA networks. Note that ARIB defines a related but different MIME type for content that conforms to the MPEG_TS_JP_T profile in ARIB STD B-21:2005.

9.2.7.3 MPEG-2 AV format: MIME type definition for 188 B Transport Packets**9.2.7.3.1****[PROFILES]**

MPEG_TS_SD_NA_ISO
 MPEG_TS_HD_NA_ISO
 MPEG_TS_NA_ISO
 MPEG_TS_NA_3DFC_ISO
 MPEG_TS_SD_KO_ISO
 MPEG_TS_HD_KO_ISO
 MPEG_TS_SD_EU_ISO
 MPEG_TS_SD_EU_DTS_ISO
 MPEG_TS_SD_DTS_ISO
 MPEG_TS_HD_DTS_ISO

9.2.7.3.2

[GUIDELINE] The MIME type "video/mpeg" shall be used for Media Format Profiles which use the 188-B DLNA Transport Packet format.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	92RER	
---	---	-----	-----	-----	-----	-------	--

9.2.8 Common format-specific guidelines for MPEG-2 Transport Streams

9.2.8.1 MPEG-2 AV format: System Stream specification

9.2.8.1.1

[PROFILES]

- MPEG_TS_SD_NA
- MPEG_TS_SD_NA_T
- MPEG_TS_SD_NA_ISO
- MPEG_TS_HD_NA
- MPEG_TS_HD_NA_T
- MPEG_TS_HD_NA_ISO
- MPEG_TS_NA_ISO
- MPEG_TS_NA_3DFC_ISO
- MPEG_TS_SD_KO
- MPEG_TS_SD_KO_T
- MPEG_TS_SD_KO_ISO
- PEG_TS_HD_KO
- MPEG_TS_HD_KO_T
- MPEG_TS_HD_KO_ISO
- MPEG_TS_SD_EU
- MPEG_TS_SD_EU_T
- MPEG_TS_SD_EU_ISO
- MPEG_TS_JP_T

9.2.8.1.2

[GUIDELINE] The main characteristics of the MPEG-2 Transport system stream are:

System

System Stream is Full or Partial Single Programme Transport Stream (SPTS). It shall contain only one programme from the original broadcasted TS according to the PAT and PMT tables. A Full SPTS shall be fully compliant with ISO/IEC 13818-1:2000 while a Partial SPTS shall be fully compliant with ISO/IEC 13818-1:2000 except for requirements related to the T-STD model. Exceptions for scaled content binaries are detailed in guidelines 9.2.8.1.3 and 9.2.8.1.4

Number of programs

1 as defined for a Single Programme Transport Stream

Packet size

188 B per Transport Packet

PSI information

PAT and PMT are required in the multiplexed stream.

Additional information (e.g. PSI, PSIP, SI, etc.) may exist in the multiplexed stream.

Rendering Endpoints shall tolerate any additional information in the multiplexed stream.

The maximum time interval for the PAT and PMT shall not exceed 140 ms.

The time intervals for PSI tables except PAT and PMT are implementation-dependent.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 11172-3 ISO/IEC 13818-3 ATSC Standard A/53:2011 ISO/IEC 13818-2 ETSI TS 101 154:2012	6E863	C
---	---	-----	-----	-----	---	-------	---

[COMMENT]

- a) A partial SPTS can be created from MPTS by removing packets corresponding to other programs, or from another SPTS stream (by removing some components). A full or partial SPTS can have multiple audio and video components in it.
- b) For Media Format Profiles IDs that do not contain an "_ISO" suffix, the 188-B DLNA Transport Packet specified in this guideline will be preceded by a 32-bit timestamp making a 192-B DLNA Transport Packet, as described in ARIB B-24.
- c) Rendering Endpoints require PSI tables to initiate decoding. Therefore, it is encouraged that PSI tables be inserted as early in the stream as possible. Note that PSI tables can change, or not be present in the stream.

9.2.8.1.3

[GUIDELINE] A Serving Endpoint that responds to a play-speed request may return a scaled content binary that is generated by:

Dropping and/or duplicating Transport Stream packets containing select video I-frames from the non-scaled content binary

Dropping Transport Stream packets containing video B-frames and/or P-frames from the non-scaled content binary

Dropping non-video Transport Stream packets from the non-scaled content binary

The generation of scaled data streams in this fashion is called Decimation and Augmentation.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	IETF RFC 2616 :2008 ISO/IEC 13818-1:2007/A MD6:2011 ISO/IEC 13818-2	JOR7E	N
---	---	-----	-----	-----	---	-------	---

[COMMENT] This guideline provides a low-overhead option for a Serving Endpoint to generate scaled response bodies from MPEG-2 content binaries. For example, a Serving Endpoint may implement a Scale value of 2 by dropping every other frame in a 30 frames per second stream

resulting in a content stream that still contains 30 frames per second, but that appears to be playing at twice the normal speed. For slow speed trick modes, a Serving Endpoint can implement a Scale value of ½ by dividing the sample timestamps by 2, thus appearing to play at half speed.

Note that the Serving Endpoint shall restamp the decimated/augmented stream according to 9.2.8.1.4 and the framerate of the restamped stream will be limited by the frequency of I-frames in the non-scaled content binary.

9.2.8.1.4

[GUIDELINE] Scaled content binaries generated using the Decimation and Augmentation technique shall have MPEG-2 system-level fields encoded according to the play-speed scale desired. Specifically the Serving Endpoint shall:

encode the PCR, PTS, and DTS values to correspond with the play-speed scale and conformant with ISO/IEC 13818-1:2007/AMD6:2011;

encode the Transport Stream continuity_counter fields to prevent discontinuity errors by the renderer;

ensure PTS and DTS values always precede the PCR to prevent frames from being dropped.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-1:2007/A MD6:2011 ISO/IEC 13818-2	Z4SUH	E
---	---	-----	-----	-----	---	-------	---

[COMMENT] This guideline details the requirements for a Serving Endpoint using the Decimation and Augmentation technique. "Restamping" a stream in this way helps ensure that special-case logic is not required for a renderer at the MPEG-2 system level in order to render the scaled MPEG-2 binary returned by the Serving Endpoint.

9.2.8.1.5

[GUIDELINE] A Rendering Endpoint shall be able to render the scaled data stream's elementary video stream created using Decimation and Augmentation. Specifically, the Rendering Endpoint shall tolerate MPEG-2 streams with:

video framerate, timecode, and other temporal values that originate from the non-scaled bitstream frames that may not agree with system-level values (such as PCR, PTS and DTS);

partial "P" and "B" video inter-frames;

partial or missing audio and Closed Caption samples.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ISO/IEC 13818-1:2007/A MD6:2011 ISO/IEC 13818-2	MK5JA	E
---	---	---------	-------	-----	---	-------	---

[COMMENT] A binary created using Decimation and Augmentation may include partial MPEG-2 "P" /"B" frames, audio samples, and temporal values from the unscaled content binary. So Rendering Endpoints shall be able to discard and ignore artifacts from the Decimation and Augmentation process.

9.2.8.2 MPEG-2 AV format: Rendering guidelines**9.2.8.2.1****[PROFILES]**

MPEG_TS_SD_NA

MPEG_TS_SD_NA_T

MPEG_TS_SD_NA_ISO

MPEG_TS_HD_NA

MPEG_TS_HD_NA_T

MPEG_TS_HD_NA_ISO

MPEG_TS_SD_EU

MPEG_TS_SD_EU_T

MPEG_TS_SD_EU_ISO

MPEG_TS_SD_KO

PEG_TS_SD_KO_T

MPEG_TS_SD_KO_ISO

MPEG_TS_HD_KO

MPEG_TS_HD_KO_T

MPEG_TS_HD_KO_ISO

9.2.8.2.2

[GUIDELINE] A Rendering Endpoint shall tolerate but not necessarily render all audio, video and data components that belong to the (selected) programme in a full or partial SPTS according to the PAT/PMT tables.

At a minimum, a Rendering Endpoint shall render one elementary video stream and one corresponding elementary audio stream as present in TS.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ISO/IEC 11172-3 ISO/IEC 13818-3 ATSC Standard A/53:2011 ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ETSI TS 101 154:2012	X9FQ4
---	---	---------	-------	-----	--	-------

[COMMENT] AV device supporting AV Media Class content, support rendering of both audio and video components.

9.2.8.3 MPEG-2 AV format: Video Elementary Stream specification

9.2.8.3.1

[PROFILES]

- MPEG_TS_SD_NA
- MPEG_TS_SD_NA_T
- MPEG_TS_SD_NA_ISO
- MPEG_TS_SD_EU
- MPEG_TS_SD_EU_T
- MPEG_TS_SD_EU_ISO
- MPEG_TS_SD_KO
- MPEG_TS_SD_KO_T
- MPEG_TS_SD_KO_ISO

9.2.8.3.2

[GUIDELINE] The main characteristics of the MPEG-2 video stream are:

Profile:

- MP@ML.

Chroma:

- 4:2:0.

Video bitrate:

- CBR: Equal to or less than 15 Mbit/s;
- VBR: maximum bitrate equal to or less than 15 Mbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-3 ATSC Standard A/53:2011 ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ETSI TS 101 154:2012	44H9S
---	---	-----	-----	-----	---	-------

[COMMENT] Some profiles also use MP@HL MPEG-2 profile, as will be described in subsequent guideline entries.

9.2.8.4 MPEG-2 AV format: 192 B timestamped TS packet format

9.2.8.4.1

[PROFILES]

MPEG_TS_SD_NA
 MPEG_TS_SD_NA_T
 MPEG_TS_HD_NA
 MPEG_TS_HD_NA_T
 MPEG_TS_SD_KO
 MPEG_TS_SD_KO_T
 MPEG_TS_HD_KO
 MPEG_TS_HD_KO_T
 MPEG_TS_HD_KO_T
 MPEG_TS_SD_EU
 MPEG_TS_SD_EU_T
 MPEG_TS_JP_T
 MPEG_TS_HD_DTS_T

9.2.8.4.2

[GUIDELINE] When an MPEG-2 TS bitstream conformant with these profiles is transmitted, each MPEG-2 TS packet shall be preceded by a 32-bit timestamp making a 192-B packet (4-B timestamp + 188-B Transport Packet) as defined in ARIB B-24. The Timestamp format is uimbsf (unsigned integer most significant bit first) as defined in ISO/IEC 13818-1:2000.

This 32-bit field is a 27-MHz clock binary counter value to control the relative input timing to the decoder of the following Transport Packet. The 27-MHz clock is synchronized to the MPEG-2 system clock, but this counter value might not be equal to the STC counter value (i.e. they may have a constant offset). A bitstream which is conformant with the Profile IDs that do not have "_T" suffix shall contain 0x00000000 in the timestamp field of the all packets in the stream. If the Rendering Endpoint observes zero-valued timestamp in the first 2 packets of the stream, the Rendering Endpoint shall treat the timestamp as not available for the stream.

When the timestamp is provided, the accuracy of the timestamp should be within ± 500 ns.

Corresponding Profile IDs have "_T" appended as part of their Profile Identifier (e.g. MPEG_TS_SD_NA_T etc.) to indicate the content stream has valid timestamp values.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ARIB B-24	YM377
---	---	-----	-----	-----	-----------	-------

[COMMENT] A conformant bitstream might not include a valid timestamp. TTS timestamp and PCR are different in the following aspects:

PCR consists of a 9-bit 27-MHz MPEG STC extension part and a 33-bit 90-kHz base part. A TTS timestamp is a 32-bit binary 27-MHz counter.

PCR can have discontinuities. The TTS timestamp is continuous over the duration of the stream.

PCR is present with an interval of 100 ms or less. The TTS timestamp is present in every TS packet.

9.2.8.5 MPEG-2 AV format: Transport Alignment Position

9.2.8.5.1

[PROFILES]

- MPEG_TS_SD_NA
- MPEG_TS_SD_NA_T
- MPEG_TS_SD_NA_ISO
- MPEG_TS_HD_NA
- MPEG_TS_HD_NA_T
- MPEG_TS_HD_NA_ISO
- MPEG_TS_SD_EU
- MPEG_TS_SD_EU_T
- MPEG_TS_SD_EU_ISO
- MPEG_TS_SD_KO
- MPEG_TS_SD_KO_T
- MPEG_TS_SD_KO_ISO
- MPEG_TS_HD_KO
- MPEG_TS_HD_KO_T
- MPEG_TS_HD_KO_ISO

9.2.8.5.2

[GUIDELINE] The Transport Alignment Position for bitstreams conformant to these profiles shall be the DLNA Transport Packet boundary.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	n/a	E8638
---	---	-----	-------	-----	-----	-------

9.2.9 US region-specific TS profiling guidelines

9.2.9.1 MPEG-2 AV format: MPEG-2 AV stream

9.2.9.1.1

[PROFILES]

- MPEG_TS_SD_NA
- PEG_TS_SD_NA_T
- MPEG_TS_SD_NA_ISO

[GUIDELINE] A bitstream conformant with these profiles shall have the following System bitrate characteristics.

System bitrate:

- CBR or VBR up to 19,392 7 Mbit/s

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/53:2011	9FQ48	
---	---	-----	-----	-----	----------------------------	-------	--

9.2.9.2 MPEG-2 AV format: MPEG-2 Closed Caption Stream**9.2.9.2.1****[PROFILES]****MPEG_TS_SD_NA****MPEG_TS_SD_NA_T****MPEG_TS_SD_NA_ISO****MPEG_TS_HD_NA****MPEG_TS_HD_NA_T****MPEG_TS_HD_NA_ISO****9.2.9.2.2**

[GUIDELINE] A bitstream conformant with these profiles may include Closed Caption Streams with syntax, semantics, and usage rules defined in ATSC Standard A/53:2011.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ATSC Standard A/53:2011	M3774	
---	---	-----	-----	-----	----------------------------	-------	--

9.2.9.3 MPEG-2 AV format: MPEG-2 video format**9.2.9.3.1****[PROFILES]****MPEG_TS_SD_NA****MPEG_TS_SD_NA_T****MPEG_TS_SD_NA_ISO****9.2.9.3.2**

[GUIDELINE] A bitstream conformant to these profiles shall adhere to the following video encoding parameters as shown in Table 30.

Table 30 – MPEG_TS_SD_NA, MPEG_TS_SD_NA_T

Resolution	Aspect ratio	Field (interlaced) or Frame (progressive) rate
720 × 480	16:9	29,97p
720 × 480	16:9	59,94i
720 × 480	4:3	29,97p
720 × 480	4:3	59,94i
704 × 480	16:9	59,94i and 60i
704 × 480	16:9	29,97p and 30p
704 × 480	16:9	23,976p and 24p
704 × 480	4:3	59,94i and 60i
704 × 480	4:3	29,97p and 30p
704 × 480	4:3	23,976p and 24p
640 × 480	4:3	59,94i and 60i
640 × 480	4:3	29,97p and 30p
640 × 480	4:3	23,976p and 24p
640 × 480	Square	59,94i and 60i
640 × 480	Square	29,97p and 30p
640 × 480	Square	23,976p and 24p
544 × 480	16:9	59,94i
544 × 480	4:3	29,97p
544 × 480	4:3	59,94i
480 × 480	16:9	59,94i
480 × 480	4:3	29,97p
480 × 480	4:3	59,94i
352 × 480	16:9	59,94i
352 × 480	4:3	29,97p
352 × 480	4:3	59,94i

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011 CEA-849A ANSI/SCTE 54: 2006/2009	4H9SU	E
---	---	-----	-----	-----	--	-------	---

[COMMENT] 60i means interlaced sequence of 30 fps frame rate.

9.2.9.4 MPEG-2 AV format: ATSC EDTV stream format**9.2.9.4.1****[PROFILES]****MPEG_TS_SD_NA****MPEG_TS_SD_NA_T****MPEG_TS_SD_NA_ISO****[GUIDELINE]** The main characteristics of the MPEG-2 video stream are:

Profile:

- MP@HL.

Chroma:

- 4:2:0.

Video bitrate

- CBR: less than or equal to (19,392 7 Mbit/s minus the sum of audio, Closed Caption data, other SI tables and TS overhead);
- VBR: maximum bitrate less than or equal to (19,392 7 Mbit/s minus the sum of audio, Closed Caption data other SI tables and TS overhead).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011	8638X
---	---	-----	-----	-----	---	-------

[COMMENT] This is an additional profiling of MPEG_TS_SD_NA format profile that specifies different MPEG-2 Profiles (i.e. MP@HL).**9.2.9.5 MPEG-2 AV format: ATSC EDTV video format****9.2.9.5.1****[PROFILES]****MPEG_TS_SD_NA****MPEG_TS_SD_NA_T****MPEG_TS_SD_NA_ISO****[GUIDELINE]** Video encoding parameters as shown below in Table 31.

Table 31 – Additional parameters for MPEG_TS_SD_NA, MPEG_TS_SD_NA_T

Resolution	Aspect ratio	Field (interlaced) or Frame (progressive) rate
704 × 480	16:9	59,94p and 60p
704 × 480	4:3	59,94p and 60p
640 × 480	4:3	59,94p and 60p
640 × 480	Square	59,94p and 60p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011	FQ485
---	---	-----	-----	-----	---	-------

[COMMENT] This is an additional profiling of MPEG_TS_SD_NA format profile that specifies different MPEG-2 Profile (i.e. MP@HL) to support Enhanced Definition TV.

9.2.9.6 MPEG-2 AV format: audio portion profiling: AC-3

9.2.9.6.1

[PROFILES]

MPEG_TS_SD_NA

MPEG_TS_SD_NA_T

PEG_TS_SD_NA_ISO

MPEG_TS_HD_NA

MPEG_TS_HD_NA_T

MPEG_TS_HD_NA_ISO

9.2.9.6.2

[GUIDELINE] The main characteristics of the ATSC AC-3 audio stream are:

Sampling rate:

- 48 kHz.

Content audio channel modes:

A bitstream conformant to these Media Format Profiles may contain the following AC-3 formats:

- Mono (1/0);
- Stereo (2/0);
- Multi-channels (3/0);
- Multi-channels (2/1);
- Multi-channels (3/1);
- Multi-channels (2/2);

- Multi-channels (3/2).

A bitstream conformant to these Media Format Profiles shall be conformant with the requirements of ATSC Standard A/53:2011.

Audio bitrate:

- Main audio service up to 448 kbit/s per stream.

The combined bitrate of a main service and an associated service which are intended to be decoded simultaneously shall be up to 576 kbit/s.

[ATTRIBUTES]

M	R /L	n/a	n/a	n/a	ATSC Standard A/52:2012 ATSC Standard A/53:2011	H9SUL	
---	---------	-----	-----	-----	--	-------	--

9.2.9.7 MPEG-2 AV format: system stream

9.2.9.7.1

[PROFILES]

MPEG_TS_HD_NA

MPEG_TS_HD_NA_T

MPEG_TS_HD_NA_ISO

9.2.9.7.2

[GUIDELINE] A bitstream conformant with these profiles shall have the following System bitrate characteristics.

System bitrate:

- CBR or VBR up to 19,392 7 Mbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/53:2011	638XC	
---	---	-----	-----	-----	----------------------------	-------	--

9.2.9.8 MPEG-2 AV format: Stream format

9.2.9.8.1

[PROFILES]

MPEG_TS_HD_NA

MPEG_TS_HD_NA_T

MPEG_TS_HD_NA_ISO

9.2.9.8.2

[GUIDELINE] The main characteristics of the MPEG-2 video stream are:

Profile:

➤ MP@HL.

Chroma:

➤ 4:2:0.

Video bitrate:

- CBR: less than or equal to (19,392 7 Mbit/s minus the sum of audio, Closed Caption data, other SI tables and TS overhead);
- VBR: maximum bitrate less than or equal to (19,392 7 Mbit/s minus the sum of audio, Closed Caption data other SI tables and TS overhead).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011	3774E
---	---	-----	-----	-----	---	-------

9.2.9.9 MPEG-2 AV format: video format

9.2.9.9.1

[PROFILES]

MPEG_TS_HD_NA

MPEG_TS_HD_NA_T

MPEG_TS_HD_NA_ISO

9.2.9.9.2

[GUIDELINE] A bitstream conformant to these profiles shall adhere to the following video encoding parameters as shown in Table 32.

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Table 32 – Video MPEG-2 AV encoding parameters

Resolution	Aspect ratio	Field (interlaced) or Frame (progressive) rate
1 920 × 1 080	16:9	59,94i and 60i
1 920 × 1 080	16:9	29,97p and 30p
1 920 × 1 080	16:9	23,976p and 24p
1 920 × 1 080	Square	59,94i and 60i
1 920 × 1 080	Square	29,97p and 30p
1 920 × 1 080	Square	23,976p and 24p
1 280 × 720	16:9	59,94p and 60p
1 280 × 720	16:9	29,97p and 30p
1 280 × 720	16:9	23,976p and 24p
1 280 × 720	Square	59,94p and 60p
1 280 × 720	Square	29,97p and 30p
1 280 × 720	Square	23,976p and 24p
1 440 × 1 080	16:9	29,97p and 30p
1 440 × 1 080	16:9	23,976p and 24p
1 440 × 1 080	16:9	59,94i and 60i
1 280 × 1 080	16:9	29,97p and 30p
1 280 × 1 080	16:9	23,976p and 24p
1 280 × 1 080	16:9	59,94i and 60i

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011 CEA-849A ANSI/SCTE 54: 2006/2009	Q485T
---	---	-----	-----	-----	--	-------

9.2.9.10 MPEG-2 AV format: system portion profile: TS_NA_ISO**9.2.9.10.1****[PROFILES]****MPEG_TS_NA_ISO****MPEG_TS_NA_3DFC_ISO****9.2.9.10.2**

[GUIDELINE] The main characteristics of this MPEG-2 Transport Stream are defined in ANSI/SCTE 54:2006/2009 and ATSC Standard A/53:2011 with additional constraints as defined in 9.2.8.1.2 and 9.2.8.5.2.

The main characteristics of this MPEG-2 Transport Stream are:

System:

- System Stream is Full or Partial Single Programme Transport Stream (SPTS). It shall contain only one programme from the original broadcast TS according to the PAT and PMT tables. A Full SPTS shall be fully compliant with ISO/IEC 13818-1:2000 while a Partial SPTS shall be fully compliant with ISO/IEC 13818-1:2000 except for requirements related to the T-STD model.

Number of programmes:

- 1 as defined for a Single Programme Transport Stream.

Packet size:

- 188 B per Transport Packet.

System bitrate:

- CBR or VBR up to 19,392 7 Mbit/s.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ANSI/SCTE 54: 2006/2009 ATSC Standard A/53:2011	JHBLK	
---	---	-----	-----	-----	--	-------	--

[COMMENT] A MPEG Transport Stream as defined in ANSI/SCTE 54:2006/2009 and ATSC Standard A/53:2011, and constrained to SPTS. This profile is better aligned with the technical requirements of the cable and broadcast industry in North America than the MPEG_TS_SD_NA and MPEG_TS_HD_NA profiles defined in this standard.

9.2.9.10.3

[GUIDELINE] A bitstream conformant with this profile may include the caption_services_descriptor in the PMT as defined in ANSI/SCTE 54:2006/2009 and as defined in ATSC Standard A/65. The presence of the caption_services_descriptor indicates that one or more Closed Caption services are present in the bitstream.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 54: 2006/2009 ATSC Standard A/65	LIFHM	
---	---	-----	-----	-----	---	-------	--

9.2.9.10.4

[GUIDELINE] A bitstream conformant with this profile may include in the content_advisory_descriptor in the PMT as defined in ANSI/SCTE 54:2006/2009 and ATSC Standard A/65.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 54: 2006/2009 ATSC Standard A/65	5IAYU	
---	---	-----	-----	-----	---	-------	--

9.2.9.10.5

[GUIDELINE] A bitstream conformant with this profile may include an RRT as defined in in ATSC Standard A/65 that corresponds to the content_advisory_descriptor present in the PMT.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ATSC Standard A/65	53J8V	
---	---	-----	-----	-----	--------------------	-------	--

9.2.9.10.6

[GUIDELINE] A Rendering Endpoint shall be able to tolerate the content_advisory_descriptor in the PMT as defined in ANSI/SCTE 54:2006/2009 and rating information in the RRT as defined in ATSC Standard A/65.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 54: 2006/2009 ATSC Standard A/65	XCEI4	A
---	---	---------	-------	-----	--	-------	---

9.2.9.10.7

[GUIDELINE] A Rendering Endpoint should be capable of enforcing Content Advisory information, if present in the bitstream and requested by a user.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 54: 2006/2009 ATSC Standard A/65	GGVPH	A
---	---	---------	-------	-----	--	-------	---

9.2.9.10.8

[GUIDELINE] Rendering Endpoints shall conform to guideline 9.2.8.2.2.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	n/a	TDX84	A
---	---	---------	-------	-----	-----	-------	---

9.2.9.10.9

[GUIDELINE] A bitstream conformant with this profile may include ETV interactive services signalling information as defined in OC-SP-ETV-AM1.0.1.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	OC-SP-ETV-A M1.0.1	TW8DQ	
---	---	-----	-----	-----	--------------------	-------	--

[COMMENT] The enhanced TV (ETV) interactive signaling as defined in OC-SP-ETV-AM1.0.1 is used to signal cable interactive services.

9.2.9.10.10

[GUIDELINE] If ETV interactive signalling services information is present in the bitstream, it shall be indicated in the PMT by a stream_type value of 0x05 or 0xC0, in combination with the etv_registration_descriptor (descriptor_tag = 0x05 and etv_format_identifier = "ETV1" (ascii)), etv_integrated_signaling_descriptor (descriptor tag = 0xA2) and etv_bif_platform_descriptor (descriptor_tag = 0xA1) as defined in OC-SP-ETV-AM1.0.1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	OC-SP-ETV-A M1.0.1	WLZ4H	
---	---	-----	-----	-----	-----------------------	-------	--

[COMMENT] The presence of the etv_integrated_signaling_descriptor indicates that one or more ETV interactive signaling services are present in the bitstream.

9.2.9.10.11

[GUIDELINE] A bitstream conformant with this profile may include SCTE-35 services information with stream_type 0x86 and cue_identifier_descriptor (tag = 0x8A) in the PMT as defined in ANSI/SCTE 35. The presence of the cue_identifier_descriptor indicates that one or more SCTE-35 services are present in the bitstream.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 35	KWO35	
---	---	-----	-----	-----	--------------	-------	--

[COMMENT] SCTE-35 messages are used in cable mainly to signal an event such as a commercial insertion opportunity, where a splicer usually replaces a portion of the programme content with a locally generated content e.g. local advertisement, short programming, etc.

9.2.9.10.12

[GUIDELINE] A bitstream conformant with this profile may include one or more audio streams that are a translation of the main audio.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 10918-1	8AMZA	
---	---	-----	-----	-----	--------------------	-------	--

9.2.9.10.13

[GUIDELINE] The language of each audio stream shall be indicated by an ISO_639 language descriptor in the PMT, ISO/IEC 10918-1. The main audio shall be the first audio stream in the PMT.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 10918-1	WC2JM	
---	---	-----	-----	-----	--------------------	-------	--

9.2.9.10.14

[GUIDELINE] A bitstream conformant with this profile may include one or more descriptive video service streams as defined in ATSC Standard A/53:2011.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ATSC Standard A/53:2011	4C7PA	
---	---	-----	-----	-----	----------------------------	-------	--

9.2.9.10.15

[GUIDELINE] The presence of a VI service encoded using AC-3 shall be signaled by setting the bsmmod parameter in the AC-3 bitstream and in the AC-3_audio_stream_descriptor() to '010', and by setting the full_svc flag =1 in the AC-3_audio_stream_descriptor() to '1', as specified in ATSC Standard A/53:2011

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ATSC Standard A/53:2011	HDGFG	
---	---	-----	-----	-----	----------------------------	-------	--

9.2.9.10.16

[GUIDELINE] A bitstream conformant with this profile may include one or more subtitle services information with stream_type 0x82 in the PMT as defined in ANSI/SCTE 27.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 27	XMLCY	
---	---	-----	-----	-----	--------------	-------	--

9.2.9.11 MPEG-2 AV format: system portion profile: TS_NA_3DFC_ISO**9.2.9.11.1****[PROFILES]****MPEG_TS_NA_3DFC_ISO****9.2.9.11.2**

[GUIDELINE] A bitstream conformant with this profile may include the 3d_MPEG2_descriptor as defined in ANSI/SCTE 187-2, or the MPEG2_stereoscopic_video_format_descriptor as defined in ISO/IEC 13818-1:2007/AMD6:2011.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 13818-1:2007/A MD6:2011 ANSI/SCTE 18 7-2	2HVU3	
---	---	-----	-----	-----	--	-------	--

[COMMENT] A certain amount of MPEG-2 3D video content was made available before these descriptors were fully defined. As this content may be present in a DLNA network, and advertised using this Profile ID, a Rendering Endpoint that supports this profile should provide manual selection of the proper 3D mode to the consumer. Support for two different descriptors allows content that uses the legacy 3d_MPEG2_descriptor, and content that uses the newer MPEG2_stereoscopic_video_format_descriptor, to be advertised as conforming to this profile.

9.2.9.11.3

[GUIDELINE] A Rendering Endpoint that supports this profile shall tolerate the presence of the MPEG2_stereoscopic_video_format_descriptor (descriptor tag value of 0x34) and the optional 3d_MPEG2_descriptor (descriptor tag value of 0xE8) in the PMT of a bitstream that conforms to this profile, as defined in ANSI/SCTE 187-2.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 187-2	QAUXA	
---	---	---------	-------	-----	-----------------	-------	--

9.2.9.11.4

[GUIDELINE] A Rendering Endpoint that supports this profile should be capable of detecting the presence of stereoscopic 3D (S3D) video formats signalled by either the MPEG2_stereoscopic_video_format_descriptor (descriptor tag value of 0x34) or the optional 3D_MPEG2_descriptor (descriptor tag value of 0xE8) as described in ANSI/SCTE 187-2.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 187-2	KJQ8H	
---	---	---------	-------	-----	-----------------	-------	--

9.2.9.12 MPEG-2 AV format: video portion profile: TS_NA_ISO

9.2.9.12.1

[PROFILES]

MPEG_TS_NA_ISO

MPEG_TS_NA_3DFC_ISO

9.2.9.12.2

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 13818-2 as constrained by ANSI/SCTE 43, with further constraints as specified below.

The main characteristics of MPEG-2 video streams are:

Profiles and level:

- Main Profile at High Level;
- Main Profile at Main Level.

Chroma:

- 4:2:0.

Video bitrate:

- CBR: less than or equal to 19,392.7 Mbit/s minus the sum of audio, Closed Caption data, other SI tables and TS overhead;
- VBR: maximum bitrate less than or equal to 19,392.7 Mbit/s minus the sum of audio, Closed Caption data other SI tables and TS overhead.

Table 33 lists additional characteristics of the MPEG-2 video stream.

Table 33 – MPEG-2 AV format resolution

Resolution	Aspect Ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	1:1, 16:9	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
1 440 × 1 080	16:9	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
1 280 × 720	1:1, 16:9	60p, 59,94p, 30p, 29,97p, 24p, 23,976p
720 × 480	4:3, 16:9	60p, 59,94p, 60i, 59,94i, 30p, 29,97p, 24p, 23,976p
704 × 480	4:3, 16:9	60p, 59,94p, 60i, 59,94i, 30p, 29,97p, 24p, 23,976p
640 × 480	1:1, 4:3	60p, 59,94p, 60i, 59,94i, 30p, 29,97p, 24p, 23,976p
544 × 480	4:3	59,94i, 23,976p
528 × 480	4:3	59,94i, 23,976p
352 × 480	4:3	59,94i, 23,976p

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-2 ANSI/SCTE 43	7UQB8	C
---	---	-----	-----	-----	---------------------------------	-------	---

9.2.9.12.3

[GUIDELINE] A Rendering Endpoint shall be able to render video for bit streams with stream_type code of 0x02 and 0x80 as specified in 5.8.2.1 of ANSI/SCTE 54:2006/2009.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 54: 2006/2009	IBW5S	
---	---	---------	-------	-----	----------------------------	-------	--

[COMMENT] As specified in ANSI/SCTE 54:2006/2009, content sourced by the cable industry in North America uses both stream types of 0x02 and 0x80. This requirement clarifies that the Rendering Endpoints are required to display video for both stream types of 0x02 and 0x80.

9.2.9.12.4

[GUIDELINE] A bitstream conformant with this profile may include Closed Caption Streams with syntax, semantics, and usage rules defined in 6.2 of ATSC Standard A/53:2011, Part 4.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ATSC Standard A/53:2011	4VUIQ	C
---	---	-----	-----	-----	----------------------------	-------	---

9.2.9.12.5

[GUIDELINE] A Rendering Endpoint shall be able to tolerate Closed Caption Streams with syntax, semantics, and usage rules defined in section 6.2 of ATSC Standard A/53:2011, Part 4.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ATSC Standard A/53:2011	L5AGA	C
---	---	---------	-------	-----	----------------------------	-------	---

9.2.9.12.6

[GUIDELINE] A Rendering Endpoint should be capable of displaying Closed Captions Streams with syntax, semantics, and usage rules defined in section 6.2 of ATSC Standard A/53:2011, Part 4, if present and requested by a user.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ATSC Standard A/53:2011	UP3YZ	C
---	---	---------	-------	-----	-------------------------	-------	---

9.2.9.13 MPEG-2 AV format: video portion profile: TS_NA_3DFC_ISO

9.2.9.13.1

[PROFILE]

MPEG_TS_NA_3DFC_ISO

9.2.9.13.2

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 13818-2 as constrained by ANSI/SCTE 43, ANSI/SCTE 187-1, ANSI/SCTE 187-2 and Part 4 of ATSC Standard A/53:2011, with further constraints as specified below.

Table 34 – MPEG-2 3DFC Format Resolutions

Resolution	Multiplexing	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 x 1 080	TaB	□ 24p, 23,976p
1 920 x 1 080	SbS	□ 60i, 59,94i
1 280 x 720	TaB	□ 60p, 59,94p

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-2 ATSC Standard A/53:2011 ANSI/SCTE 43 ANSI/SCTE 187-1 ANSI/SCTE 187-2	WEPXY	
---	---	-----	-----	-----	--	-------	--

[COMMENT] Top-and-Bottom (TaB) formatting is illustrated by Figure 2 below and Side-by-side (SbS) formatting is illustrated by Figure 3 below.

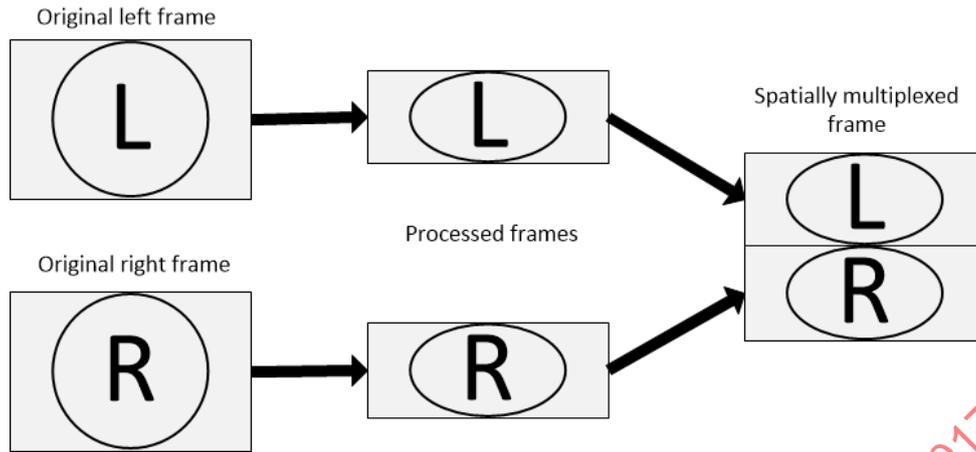


Figure 2 – TaB Multiplexing

IEC

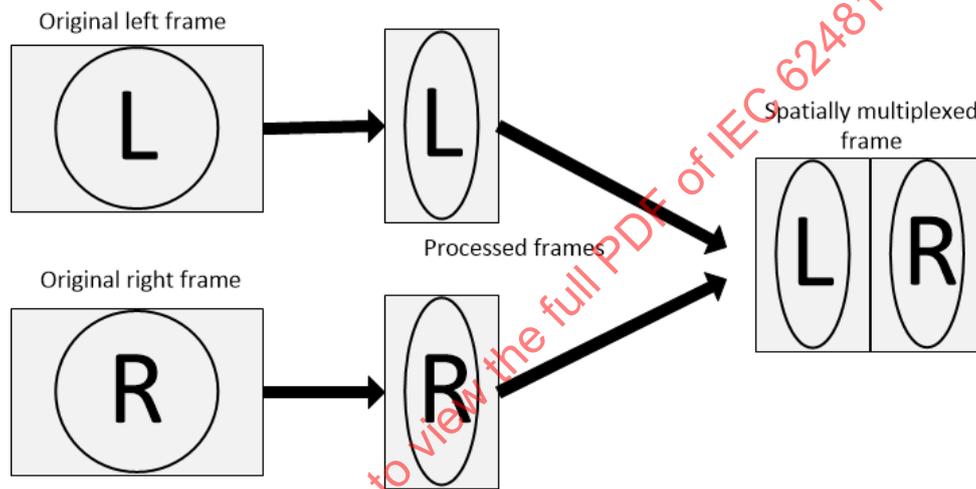


Figure 3 – SbS Multiplexing

IEC

9.2.9.13.3

[GUIDELINE] If a bitstream conformant with this profile includes S3D_video_format_signaling_identifier information stored in picture header user data, this data shall be stored according to ANSI/SCTE 187-1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ANSI/SCTE 187-1	YLNS9	
---	---	-----	-----	-----	-----------------	-------	--

9.2.9.13.4

[GUIDELINE] A Rendering Endpoint conformant with this profile shall be able to detect the S3D_video_format_type included in the S3D_video_format_signaling_identifier information, as described in ANSI/SCTE 187-1.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 187-1	RZ6RL	A
---	---	---------	-------	-----	-----------------	-------	---

9.2.9.14 MPEG-2 AV format: audio portion profile: TS_NA_ISO

9.2.9.14.1

[PROFILES]

MPEG_TS_NA_ISO

MPEG_TS_NA_3DFC_ISO

9.2.9.14.2

[GUIDELINE] The main characteristics of this MPEG_TS_NA_ISO audio stream are defined in ATSC Standard A/53:2011.

Sampling rate:

- 48 kHz.

Content audio channel modes:

- Mono (1/0);
- Stereo (2/0);
- Multi-channel (3/0);
- Multi-channel (2/1);
- Multi-channel (3/1);
- Multi-channel (2/2);
- Multi-channel (3/2).

Bitrates:

Main audio service up to 640 kbit/s per stream.

The combined bitrate of a main service and an associated service that are intended to be decoded simultaneously shall be up to 576 kbit/s (448 kbit/s Main, 192 kbit/s Associated).

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ATSC Standard A/53:2011	9IRQZ	
---	---	-----	-----	-----	-------------------------	-------	--

9.2.9.14.3

[GUIDELINE] A Rendering Endpoint shall be able to render audio from bit streams with a stream_type code of 0x81 as specified in section 5.8.2.2 of ANSI/SCTE 54:2006/2009.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 54: 2006/2009	4TORC	E
---	---	---------	-------	-----	-------------------------	-------	---

9.2.10 Korean region-specific TS profiling guidelines

9.2.10.1 MPEG-2 AV format: MPEG-2 AV stream

9.2.10.1.1

[PROFILES]

MPEG_TS_SD_KO**PEG_TS_SD_KO_T****MPEG_TS_SD_KO_ISO****9.2.10.1.2**

[GUIDELINE] A bitstream conformant with these profiles shall have the following System bitrate characteristics.

System bitrate:

- CBR or VBR up to 19,392 7 Mbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/53:2011	9SUL5	C
---	---	-----	-----	-----	-------------------------	-------	---

9.2.10.2 MPEG-2 AV format: Closed Caption**9.2.10.2.1****[PROFILES]**

MPEG_TS_SD_KO
MPEG_TS_SD_KO_T
MPEG_TS_SD_KO_ISO
MPEG_TS_HD_KO
MPEG_TS_HD_KO_T
MPEG_TS_HD_KO_ISO

9.2.10.2.2

[GUIDELINE] A bitstream conformant with these profiles may include Closed Caption Streams with syntax, semantics, and usage rules defined in ATSC Standard A/53:2011.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ATSC Standard A/53:2011	774E9	
---	---	-----	-----	-----	-------------------------	-------	--

9.2.10.3 MPEG-2 AV format: audio portion profiling AC-3**9.2.10.3.1****[PROFILES]**

MPEG_TS_SD_KO
PEG_TS_SD_KO_T
MPEG_TS_SD_KO_ISO
MPEG_TS_HD_KO
MPEG_TS_HD_KO_T
MPEG_TS_HD_KO_ISO

9.2.10.3.2

[GUIDELINE] Main characteristics of ATSC AC-3 audio stream are

Sampling rate:

- 48 kHz.

Content audio channel modes:

Rendering Endpoints shall tolerate the following AC-3 formats:

- Mono (1/0);
- Stereo (2/0);
- Multi-channels (3/0);
- Multi-channels (2/1);
- Multi-channels (3/1);
- Multi-channels (2/2);
- Multi-channels (3/2).

A bitstream conformant to these Media Format Profiles shall be conformant with the requirements of ATSC Standard A/53:2011.

Audio bitrate:

Main audio service up to 448 kbit/s per stream.

The combined bitrate of a main service and an associated service that are intended to be decoded simultaneously shall be up to 576 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/52:2012 ATSC Standard A/53:2011	38XC3
---	---	-----	-----	-----	--	-------

9.2.10.4 MPEG-2 AV format: video format

9.2.10.4.1

[PROFILES]

MPEG_TS_SD_KO

MPEG_TS_SD_KO_T

MPEG_TS_SD_KO_ISO

[GUIDELINE] A bitstream conformant to these profiles shall adhere to the following video encoding parameters as shown in Table 35.

Table 35 – MPEG_TS_SD_KO, MPEG_TS_SD_KO_T

Resolution	Aspect ratio	Field (interlaced) or Frame (progressive) rate
704 × 480	16:9	29,97p and 30p
704 × 480	16:9	23,976p and 24p
704 × 480	16:9	59,94i and 60i
704 × 480	4:3	29,97p and 30p
704 × 480	4:3	23,976p and 24p
704 × 480	4:3	59,94i and 60i
640 × 480	4:3	29,97p and 30p
640 × 480	4:3	23,976p and 24p
640 × 480	4:3	59,94i and 60i

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011	485TR
---	---	-----	-----	-----	---	-------

9.2.10.5 MPEG-2 AV format: video stream specification**9.2.10.5.1****[PROFILES]****MPEG_TS_HD_KO****MPEG_TS_HD_KO_T****MPEG_TS_HD_KO_ISO****9.2.10.5.2**

[GUIDELINE] A bitstream conformant with these profiles shall have the following System bitrate characteristics.

System bitrate:

- CBR or VBR up to 19,392 7 Mbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ATSC Standard A/53:2011	SUL5D
---	---	-----	-----	-----	----------------------------	-------

9.2.10.6 MPEG-2 AV format: video stream format**9.2.10.6.1****[PROFILES]**

MPEG_TS_HD_KO
MPEG_TS_HD_KO_T
MPEG_TS_HD_KO_ISO

9.2.10.6.2

[GUIDELINE] Main characteristics of MPEG-2 video stream are:

Profile:

MP@HL.

Chroma:

4:2:0.

Video bitrate:

- CBR: less than or equal to (19,392 7 Mbit/s minus the sum of audio, Closed Caption data, other SI tables and TS overhead);
- VBR: maximum bitrate less than or equal to (19,392 7 Mbit/s minus the sum of audio, Closed Caption data other SI tables and TS overhead).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011	74E9R
---	---	-----	-----	-----	---	-------

9.2.10.7 MPEG-2 AV format: video format

9.2.10.7.1

[PROFILES]

MPEG_TS_HD_KO
MPEG_TS_HD_KO_T
MPEG_TS_HD_KO_ISO

9.2.10.7.2

[GUIDELINE] A bitstream conformant to these profiles shall adhere to the video encoding parameters shown in Table 36.

Table 36 – MPEG_TS_HD_KO, MPEG_TS_HD_KO_T

Resolution	Aspect ratio	Field (interlaced) or Frame (progressive) rate
1 920 × 1 080	16:9	59,94i and 60i
1 280 × 720	16:9	59,94p and 60p
704 × 480	16:9	59,94p and 60p
704 × 480	4:3	59,94p and 60p
640 × 480	4:3	59,94p and 60p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ATSC Standard A/53:2011	8XC3R	
---	---	-----	-----	-----	---	-------	--

9.2.11 European region-specific TS profiling guidelines**9.2.11.1 MPEG-2 AV format: Europe region: compliance****9.2.11.1.1****[PROFILES]****MPEG_TS_SD_EU****MPEG_TS_SD_EU_T****MPEG_TS_SD_EU_ISO****9.2.11.1.2****[GUIDELINE]** A bitstream compliant with these profiles shall comply with the following.

In ETSI TS 101 154:2012, 4.1 defining the use of ISO/IEC 13818-1:2000 for IRDs and bit streams in DVB.

In ETSI TS 101 154:2012, 5.1 defining the use of ISO/IEC 13818-2 for 25 Hz SDTV IRDs and bit streams in DVB.

In ETSI TS 101 154:2012, Clause 6 defining the use of ISO/IEC 13818-3 and ISO/IEC 11172-3 for IRDs and bit streams in DVB.

All requirements for the MPEG_TS_SD_EU profile defined in this standard that further specify, limit or otherwise modify the requirements for 25 Hz SDTV IRDs and bit streams in DVB as defined in ETSI TS 101 154:2012.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ISO/IEC 13818-2 ISO/IEC 13818-3 ISO/IEC 11172-3 ETSI TS 101 154:2012	85TRQ	
---	---	-----	-----	-----	--	-------	--

[COMMENT] 30 Hz systems and HDTV are out of the scope of this guideline.**9.2.11.2 MPEG-2 AV format: system portion profiling, TS_SD_EU****9.2.11.2.1****[PROFILES]**

MPEG_TS_SD_EU
MPEG_TS_SD_EU_T
MPEG_TS_SD_EU_ISO

9.2.11.2.2

[GUIDELINE] The main characteristics of the MPEG-2 European DVB Full Transport Stream are:

TS format with PSI and SI tables as specified in ETSI TS 101 154:2012, 4.1, ETSI EN 300 468:2009. Other program-related data may be present as per ETSI ES 201 812.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 101 154:2012 ETSI EN 300 468:2009 ETSI ES 201 812	C3R8D	
---	---	-----	-----	-----	--	-------	--

[COMMENT] The intent of this guideline is to ensure that TS complies with relevant DVB specifications.

9.2.11.2.3

[GUIDELINE] A partial SPTS format is a TS with gaps of variable length between the TS packets. It shall contain only one programme from the original broadcast TS. A partial SPTS shall carry at least the following PSI and SI tables as defined in ISO/IEC 13818-1:2000, ETSI TS 101 154:2012, and ETSI EN 300 468:2009:

PAT and PMT.

SIT and the corresponding partial TS descriptor.

DIT whenever there is a discontinuity in the SI information.

[ATTRIBUTES]

M	F	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ETSI TS 101 154:2012 ETSI EN 300 468:2009 ETSI ES 201 812	5KMGT	
---	---	-----	-----	-----	---	-------	--

[COMMENT] A Full SPTS is fully compliant with ISO/IEC 13818-1:2000. A Partial SPTS is fully compliant with ISO/IEC 13818-1:2000 except for the T-STD buffer model.

9.2.11.2.4

[GUIDELINE] A Rendering Endpoint may process a DIT as defined in ETSI EN 300 468:2009 in a partial SPTS.

[ATTRIBUTES]

O	A	DMP DMR	M-DMP	n/a	ETSI EN 300 468:2009	5D5A3	
---	---	---------	-------	-----	-------------------------	-------	--

9.2.11.2.5

[GUIDELINE] A bitstream compliant with these profiles is strongly recommended to contain a partial SPTS with all of the SI tables as defined in ETSI EN 300 468:2009 that were part of the original broadcast TS as well as all audio, video and data components that belong to the (selected) programme according to the PAT/PMT tables, and CAT, if need be. This includes components that contain DVB defined data that belong to that programme such as teletext as defined in ETSI EN 300 472, other VBI data as defined in ETSI EN 301 775, object carrousel as defined in ETSI EN 301 192, or MHP data as defined in ETSI ES 201 812.

[ATTRIBUTES]

S	A	n/a	n/a	n/a	ETSI EN 300 468:2009 ETSI EN 301 775 ETSI EN 300 472 ETSI EN 301 192 ETSI ES 201 812	3R8DR	
---	---	-----	-----	-----	---	-------	--

[COMMENT] Even though content protection is out of the scope of this document, inserting the CAT table to accommodate a DMP that is capable of decryption is allowed.

9.2.11.2.6

[GUIDELINE] A Rendering Endpoint shall tolerate all audio, video and data components that belong to the (selected) programme in a full or partial SPTS according to the PAT/PMT tables.

This includes components that contain DVB defined data that belong to that programme such as teletext as defined in ETSI EN 300 472, other VBI data as defined in ETSI EN 301 775, object carrousel as defined in ETSI EN 301 192, or MHP data as defined in ETSI ES 201 812 and others.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ETSI EN 300 468:2009 ETSI EN 301 775 ETSI EN 300 472 ETSI EN 301 192 ETSI ES 201 812	TRQEX	
---	---	---------	-------	-----	---	-------	--

9.2.11.2.7

[GUIDELINE] When the SI tables of a partial SPTS refer to programmes that are not present in the partial SPTS or otherwise conflict with data in the SIT table of that partial SPTS, the Rendering Endpoint shall ignore this SI data.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ETSI EN 300 468:2009	9RLIX	
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9.2.11.2.8

[GUIDELINE] A Rendering Endpoint that is capable of rendering both audio and video shall be able to render a full or partial SPTS containing a programme with one Video ES up to 15 Mbit/s and one stereo (2/0) Audio ES.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	RQEXI	
---	---	---------	-------	-----	-----	-------	--

9.2.11.3 MPEG-2 AV format: subtitles for TS

9.2.11.3.1

[PROFILES]

MPEG_TS_SD_EU

MPEG_TS_SD_EU_T

MPEG_TS_SD_EU_ISO

9.2.11.3.2

[GUIDELINE] A bitstream compliant with these profiles may contain DVB subtitles as specified in ETSI EN 300 743.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ETSI EN 300 743	UL5D5	
---	---	-----	-----	-----	-----------------	-------	--

9.2.11.3.3

[GUIDELINE] Rendering Endpoints shall tolerate but not necessarily render DVB subtitles as specified in ETSI EN 300 743.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	ETSI EN 300 743	4E9RL	
---	---	---------	-------	-----	-----------------	-------	--

9.2.11.3.4

[GUIDELINE] A Rendering Endpoint should be capable of rendering DVB subtitles as specified in ETSI EN 300 743 if they are present.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ETSI EN 300 743	XC3R8	
---	---	---------	-------	-----	-----------------	-------	--

[COMMENT] If DVB subtitles are not used in the country in which the device is sold, this recommendation is not applicable.

9.2.11.4 MPEG-2 AV format: teletext for TS**9.2.11.4.1****[PROFILES]****MPEG_TS_SD_EU****MPEG_TS_SD_EU_T****MPEG_TS_SD_EU_ISO****9.2.11.4.2**

[GUIDELINE] A bitstream compliant with these profiles may contain DVB teletext as specified in ETSI EN 300 472.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ETSI EN 300 472	L5D5A	
---	---	-----	-----	-----	--------------------	-------	--

9.2.11.4.3

[GUIDELINE] Rendering Endpoints shall tolerate but not necessarily render teletext as specified in ETSI EN 300 472.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	ETSI EN 300 472	5TRQE	
---	---	---------	-------	-----	--------------------	-------	--

9.2.11.5 MPEG-2 AV format: system portion profile: TS_SD_EU_DTS**9.2.11.5.1****[PROFILES]****MPEG_TS_SD_EU_DTS_ISO****9.2.11.5.2**

[GUIDELINE] A bitstream conformant with the MPEG_TS_SD_EU_DTS_ISO profile shall conform to the system portion of the MPEG_TS_SD_EU_ISO profile as defined in this document, except as indicated below.

DTS packetization

The presence of the DTS audio PES in the multiplex shall be signaled in accordance with ETSI TS 101 154:2012.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ETSI TS 101 154:2012	PQH7Z	
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9.2.11.6 MPEG-2 AV format: video portion profiling

9.2.11.6.1

[PROFILES]

MPEG_TS_SD_EU

MPEG_TS_SD_EU_T

MPEG_TS_SD_EU_ISO

MPEG_TS_SD_EU_DTS_ISO

9.2.11.6.2

[GUIDELINE] The main characteristics of the MPEG-2 TS Format / European DVB SDTV Profile video stream are:

A bitstream conformant to these profiles shall contain any of the following full-screen resolutions:

- 720 × 576 50i;
- 544 × 576 50i;
- 480 × 576 50i;
- 352 × 576 50i;
- 352 × 288 50i.

A Serving Endpoint may output and a Rendering Endpoint shall be capable of rendering the following aspect ratios:

- 4:3;
- 16:9.

A Serving Endpoint may output and a Rendering Endpoint shall accept but not necessarily render the following aspect ratios:

- 2,21:1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-2 ETSI TS 101 154:2012	8DRBU
---	---	-----	-----	-----	---	-------

[COMMENT] 50i means 50 fields per second interlaced rate.

9.2.11.7 MPEG-2 AV format: audio portion profiling: MPEG-1/2 audio

9.2.11.7.1

[PROFILES]

MPEG_TS_SD_EU

MPEG_TS_SD_EU_T

MPEG_TS_SD_EU_ISO

[GUIDELINE] The main characteristics of the MPEG-2 TS Format / European DVB Profile for MPEG-1 or MPEG-2 audio streams, according to ETSI TS 101 154:2012, Clause 6, defining the use of ISO/IEC 13818-3 and ISO/IEC 11172-3:

Coding

- MPEG-1 Layer 1;
- MPEG-1 Layer 2.

A bitstream compliant with these profiles may contain a joint stereo encoded audio stream.

No mc-prediction.

MPEG-1 backwards compatible multi-channel mode:

- MPEG-2 Layer 2 mc (multi-channel), dematrix procedure 0, 1 or 2.

Content audio channel mode:

A bitstream conformant to these Media Format Profiles may contain the following formats:

- Mono (1/0);
- Dual Monaural (1/0 + 1/0);
- Stereo (2/0);
- Multichannel (2/2);
- Multichannel (2/1);
- Multichannel (3/2);
- Multichannel (3/1);
- Multichannel (3/0);
- Multichannel (3/0 + 2/0);
- Multichannel (2/0 + 2/0);
- Multichannel ([1/0 + 1/0] + 2/0);
- Multichannel (1/0 + 2/0).

A bitstream compliant with these profiles may contain an extension stream and ancillary data fields of the audio stream.

No multilingual channels in multi-channel mode.

CRC check shall be included.

Sample rates:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Bitrates:

- Layer 1: from 32 kbit/s to 448 kbit/s;
- Layer 2: from 32 kbit/s to 384 kbit/s.

Extension stream (optional):

- From 0 kbit/s to 682 kbit/s.

No emphasis.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-3 ISO/IEC 11172-3 ETSI TS 101 154:2012	D5A3H	
---	---	-----	-----	-----	--	-------	--

[COMMENT] Serving Endpoints output one of the three basic content audio channel modes. The optional multi-channel modes use the ancillary data fields and optionally an extension stream, thereby preserving backwards compatibility to basic stereo decoders. Decoding of all multi-channel modes is optional.

9.2.11.8 MPEG-2 AV format: audio portion profiling: MPEG-1/2 audio

9.2.11.8.1

[PROFILES]

MPEG_TS_SD_EU

PEG_TS_SD_EU_T

MPEG_TS_SD_EU_ISO

9.2.11.8.2

[GUIDELINE] A bitstream compliant with these profiles may contain the following additional sample rates for secondary sound services:

- 16 kHz;
- 22,05 kHz;
- 24 kHz.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ETSI TS 101 154:2012	RLIXS	
---	---	-----	-----	-----	----------------------	-------	--

[COMMENT] European broadcasters expect DMPs to support this.

9.2.11.8.3

[GUIDELINE] Rendering Endpoint shall be able to play bitstreams which contain the following additional sample rates for secondary sound services:

- 16 kHz;
- 22,05 kHz;
- 24 kHz.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a		5A3HD	A
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9.2.11.9 MPEG-2 AV format: optional audio portion profiling: AC-3**9.2.11.9.1****[PROFILES]****MPEG_TS_SD_EU****MPEG_TS_SD_EU_T****MPEG_TS_SD_EU_ISO****9.2.11.9.2**

[GUIDELINE] The audio portion in the contents of an AV Media Class may be profiled according to the optional audio portion profiling, AC-3, as indicated in 9.2.11.9.3 and 9.2.11.10.2.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	n/a	QEXIS	
---	---	-----	-----	-----	-----	-------	--

9.2.11.9.3

[GUIDELINE] The main characteristics of the MPEG-2 TS Format / European DVB Profile AC-3 audio stream (i.e., optional audio portion profiling) are:

The coding and decoding of an AC-3 Elementary Stream is specified in ETSI TS 102 366:2014.

Sample rates:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel mode:

A bitstream conformant to these Media Format Profiles may contain the following formats that optionally include a Low Frequency Effects (LFE) channel:

- Mono (1/0);
- Dual Monaural (1 + 1);
- Stereo (2/0);
- Multichannel (3/0);
- Multichannel (2/1);
- Multichannel (3/1);
- Multichannel (2/2);
- Multichannel (3/2).

Bitrate:

from 32 kbit/s to 640 kbit/s.

AC-3 transmission in a full or partial SPTS according to ETSI TS 101 154:2012:

The AC-3 packetized Elementary Stream shall conform to the requirements of a user private stream type 1, as described in ISO/IEC 13818-1:2000.

AC-3 descriptor to distinguish the AC-3 audio stream is defined in ETSI TS 101 154:2012 and ETSI EN 300 468:2009.

The AC-3 Elementary Stream shall be byte-aligned within the MPEG-2 full or partial SPTS. This means the initial 8 bits of an AC-3 frame shall reside in a single byte, which is carried in the MPEG-2 full or partial SPTS.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ETSI TS 102 366:2014 ETSI TS 101 154:2012 ETSI EN 300 468:2009	LIXST
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9.2.11.10 MPEG-2 AV format: optional audio portion profiling: AC-3

9.2.11.10.1

[PROFILES]

MPEG_TS_SD_EU

MPEG_TS_SD_EU_T

MPEG_TS_SD_EU_ISO

9.2.11.10.2

[GUIDELINE] An AC-3 bitstream that conforms to these profiles shall comply with ETSI TS 101 154:2012.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 101 154:2012	R8DRB
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9.2.11.11 MPEG-2 AV format: audio portion profile: TS_SD_EU_DTS

9.2.11.11.1

[PROFILES]

MPEG_TS_SD_EU_DTS_ISO

9.2.11.11.2

[GUIDELINE] A bitstream conformant with this profile shall comply with ETSI TS 102 114

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 102 114	35TOI
---	---	-----	-----	-----	--------------------	-------

9.2.12 Japanese region-specific TS profiling guidelines

9.2.12.1 MPEG-2 AV format: system portion profile: TS_JP_T

9.2.12.1.1

[PROFILES]

MPEG_TS_JP_T**9.2.12.1.2**

[GUIDELINE] The main characteristics of MPEG-2 Transport system streams are:

System:

- System Stream is Partial Single Programme Transport Stream (SPTS).

Number of programs:

- 1 as defined for a Partial Single Programme Transport Stream.

Packet size:

- 192 B. Refer to 9.2.7.1.2.

Additional encapsulation:

- The sequence of 192 B DLNA Transport Packets shall be encapsulated in Content Packets as defined in ARIB STD B-21:2005.

PSI information:

- PAT and PMT are required in the multiplexed stream.
- The maximum time interval for the PAT and PMT is 120 ms.
- Additional PSI information may exist in the multiplexed stream.
- Rendering Endpoints shall tolerate any additional information in the multiplexed stream.
- The insertion intervals for PSI tables except PAT and PMT are implementation-dependent.

DIT

- DIT shall be inserted at the discontinuous point defined in ARIB TR B-14:2006, Chapter 2, 8.2.3 and in ARIB TR B-15:2006, Chapter 2, 6.2.3.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ARIB STD B-32 ARIB STD B-21:2005 ARIB TR B-14:2006 ARIB TR B-15:2006	8IUZY
---	---	-----	-----	-----	---	-------

9.2.12.2 MPEG-2 AV format: Transport Alignment Position: TS_JP_T**9.2.12.2.1****[PROFILES]****MPEG_TS_JP_T****9.2.12.2.2**

[GUIDELINE] The Transport Alignment Position for bitstreams conformant to these profiles shall be the beginning of a Content Packet according to 9.2.2.2 in ARIB STD B-21:2005.

[ATTRIBUTES]

M	A	DMS +PU+	M-DMS	n/a	ARIB STD B-21:2005	75VDD
---	---	----------	-------	-----	--------------------	-------

[COMMENT] An HTTP Server Endpoint that responds to a time-range seek request always responds with a stream that satisfies this alignment requirement. A time-range seek request always provides an initial time value from where the response starts. In order to satisfy this guideline, the endpoint could use one of two strategies:

- 1) the endpoint starts streaming from the closest Content Packet to the requested initial time value, or
- 2) the endpoint responds from the requested initial time value re-encapsulating the stream into a new series of Content Packets and ensuring that the response starts with a Content Packet.

9.2.12.2.3

[GUIDELINE] An HTTP Server Endpoint shall support TimeSeekRange.dlna.org HTTP requests for bitstreams conformant to this profile.

[ATTRIBUTES]

M	A	DMS +PU+	M-DMS	n/a	IEC 62481-1-1: 2017	DWASR
---	---	----------	-------	-----	---------------------	-------

[COMMENT] There is alignment between Content Packets and 192-byte DLNA Transport Packets when the first byte after a Content Packet header is the first byte of the 192-byte DLNA Transport Packet.

9.2.12.2.4

[GUIDELINE] An HTTP Client Endpoint shall not issue Range HTTP header (byte-seek request) for bitstreams conformant to this profile.

[ATTRIBUTES]

M	A	DMS +PU+	M-DMS	n/a	IEC 62481-1-1: 2017	ED2JD
---	---	----------	-------	-----	---------------------	-------

[COMMENT] Use of HTTP Range request is not applicable for this Media Format Profile due to the need to insert the Content Packet header.

9.2.12.3 MPEG-2 AV format: video portion profiling: TS_JP_T

9.2.12.3.1

[PROFILES]

MPEG_TS_JP_T

9.2.12.3.2

[GUIDELINE] The main characteristics of video stream shall be conformant to ISO/IEC 13818-2.

Main characteristics of MPEG-2 video streams shall be:

Profiles and level:

- MP@HL;

- MP@H-14;
- MP@ML.

Chroma

- 4:2:0.

Video bitrate

- CBR or VBR;
- 1,5 Mbit/s to 15 Mbit/s (MP@ML);
- 4 Mbit/s to 24 Mbit/s (MP@H-14);
- 8 Mbit/s to 24 Mbit/s (MP@HL).

Table 37 lists additional characteristics of the MPEG_TS_JP_T video stream.

Table 37 – MPEG_TS_JP_T

Resolution	Field (interlaced) or frame (progressive) rate	Applicable profile and level
1 920 × 1 080	59,94i	MP@HL
1 440 × 1 080	59,94i	MP@HL
1 280 × 720	59,94p	MP@HL
720 × 480	59,94p	MP@H-14
720 × 480	59,94i	MP@ML
544 × 480	59,94i	MP@ML
480 × 480	59,94i	MP@ML

Aspect ratio:

- 4:3;
- 16:9.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-2 ARIB STD B-32 ARIB STD B-21:2005 ARIB TR B-14:2006 ARIB TR B-15:2006	547GM	
---	---	-----	-----	-----	--	-------	--

[COMMENT] In ARIB TR B-14:2006 and ARIB TR B-15:2006, a part of combination of resolution and aspect ratio is allowed only when using sequence_display_extension.

9.2.12.4 MPEG-2 AV format: audio portion profiling: TS_JP_T

9.2.12.4.1

[PROFILES]

MPEG_TS_JP_T

9.2.12.5

[GUIDELINE] The main characteristics of MPEG-2 AAC streams are the following.

Main characteristics of MPEG-2 video streams shall be:

Profile:

- Low Complexity profile.

Bit stream format:

- ADTS.

Sampling rate:

- 48 kHz;
- 44,1 kHz;
- 32 kHz.

Content audio channel modes.

A bitstream conformant with this Media Format Profile shall include one of the following modes:

- Mono (1);
- Stereo (2);
- Dual Monaural (1 + 1);
- Multichannel (3/1);
- Multichannel (3/2).

The channel modes listed above may include an LFE channel.

The channel mode may change within the bitstream.

Bitrate:

- CBR only;
- Up to 384 kbit/s.

ADTS parameters:

- ID = 1 (MPEG-2 AAC);
- protection_absent = 0 (CRC check is always included);
- adts_buffer_fullness = 0x7FF is prohibited. (This means VBR is prohibited);
- no_raw_data_blocks_in_frame = 0 (One ADTS frame has only one raw_data_block).

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-7 ISO/IEC 13818-7 ARIB STD B-32 ARIB STD B-21:2005 ARIB TR B-14:2006 ARIB TR B-15:2006	OVH8T
---	---	-----	-----	-----	---	-------

9.2.13 MPEG-2 AV format: system portion profile: TS_SD_DTS, TS_HD_DTS

9.2.13.1

[PROFILES]

MPEG_TS_SD_DTS_ISO

MPEG_TS_HD_DTS_ISO

9.2.13.2

[GUIDELINE] A bitstream conformant with the MPEG_TS_SD_DTS_ISO or MPEG_TS_HD_DTS_ISO profiles shall conform to the definition in 9.2.8.1, except as indicated below.

Bitstream packetization:

DTS bitstreams shall be packed into PES packets as "private_stream_1".

Bitstream identification:

The presence of the DTS audio PES in the multiplex shall be signaled as defined in ETSI TS 102 114.

DTS registration descriptor:

In a Transport Stream environment, a registration descriptor with a registered format identifier is required to identify the DTS format. The syntax of the DTS registration descriptor is shown in Table 38.

Table 38 – DTS registration descriptor syntax

Syntax	No. of bits	Value
registration_descriptor() {		
descriptor_tag	8	0x05
descriptor_length	8	0x04
format_identifier	32	see Table 39
}		

This descriptor shall be included in the descriptor loop immediately following the ES_info_length field in the TS_program_map_section describing the DTS or DTS-HD Elementary Stream.

For the DTS format, unique format_identifier values have been assigned to represent different audio frame durations. See Table 39 for a list of these codecs.

Table 39 – DTS Format Identifier Values

Label	format_identifier	Audio frame duration (samples)
DTS1	0x44545331	512
DTS2	0x44545332	1 024
DTS3	0x44545333	2 048
DTSH	0x44545348	Various, see audio stream identifier

Audio stream descriptors:

The DTS audio stream descriptor is defined in ETSI TS 102 114, and contains information on sample rate, bitrate, frame size, surround mode and so on. This descriptor is associated with formats indicated by DTS1, DTS2, and DTS3 format identifiers in the DTS registration descriptor. The DTSH format identifier may be used when only a core substream of a DTS-HD audio stream is present.

The appropriate audio stream descriptor shall be included in the TS_program_map_section descriptor loop immediately following the DTS registration_descriptor.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ETSI TS 102 114	JE553	
---	---	-----	-----	-----	--------------------	-------	--

9.2.14 MPEG-2 AV format: video portion profile: TS_SD_DTS

9.2.14.1

[PROFILES]

MPEG_TS_SD_DTS_ISO

9.2.14.2

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 13818-2.

Main characteristics of video shall be:

Profiles and level:

- Main Profile at Main Level.

Video bitrate:

- Up to 15 Mbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-2	WFDTB	
---	---	-----	-----	-----	--------------------	-------	--

9.2.15 MPEG-2 AV format: video portion profile: TS_HD_DTS

9.2.15.1

[PROFILES]

MPEG_TS_HD_DTS_ISO

9.2.15.2

[GUIDELINE] Main characteristics of video shall be conformant to ISO/IEC 13818-2.

Main characteristics of video shall be:

Profiles and level:

- Main Profile at High Level.

Video bitrate:

- Up to 30 Mbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-2	6BCB8	
---	---	-----	-----	-----	--------------------	-------	--

9.2.16 MPEG-2 AV format: audio portion profile: TS_SD_DTS, TS_HD_DTS**9.2.16.1****[PROFILES]****MPEG_TS_SD_DTS_ISO****MPEG_TS_HD_DTS_ISO****9.2.16.2**

[GUIDELINE] A bitstream conformant with these profiles shall comply with ETSI TS 102 114, and may also contain DTS-HD audio data that complies with ETSI TS 102 114.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ETSI TS 102 114	XS6Z5	
---	---	-----	-----	-----	--------------------	-------	--

9.2.16.3

[GUIDELINE] Rendering Endpoints that are conformant with these profiles may ignore any DTS-HD audio data present in the bitstream.

[ATTRIBUTES]

O	A	DMP DMR	M-DMP	n/a	n/a	IUXQH	A
---	---	---------	-------	-----	-----	-------	---

9.2.17 MPEG-2 AV format, system portion profile: TS_HD_DTSHD_T**9.2.17.1****[PROFILES]****MPEG_TS_HD_DTSHD_T****9.2.17.2**

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the system portion of the MPEG_TS_HD_DTS_T profile, as specified in clause 9.2.21.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	HCLEF	N
---	---	-----	-----	-----	-----	-------	---

9.2.18 MPEG-2 AV format, video portion profile: TS_HD_DTSHD_T**9.2.18.1****[PROFILES]****MPEG_TS_HD_DTSHD_T**

9.2.18.2

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the video portion of the MPEG_TS_HD_DTS_T profile, as specified in clause 9.2.22.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	MOX8D	N
---	---	-----	-----	-----	-----	-------	---

9.2.19 MPEG-2 AV format, audio portion profile: TS_HD_DTSHD_T

9.2.19.1

[PROFILES]

MPEG_TS_HD_DTSHD_T

9.2.19.2

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the DTS-HD audio format as specified in 8.3.1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	5AYSP	N
---	---	-----	-----	-----	-----	-------	---

9.2.20 MPEG-2 AV format: MIME type definition

9.2.20.1

[PROFILES]

MPEG_TS_HD_DTSHD_T

9.2.20.2

[GUIDELINE] MIME type "video/vnd.dlna.mpeg-tts" shall be used for this Media Format Profile.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	UM96Y	N
---	---	-----	-----	-----	-----	-------	---

9.2.21 MPEG-2 AV format: system portion profile: TS_HD_DTS_T

9.2.21.1

[PROFILES]

MPEG_TS_HD_DTS_T

9.2.21.2

[GUIDELINE] Main characteristics of this MPEG_TS_HD stream are defined in BDA V2.5.

The main characteristics of MPEG-2 system streams are:

System:

MPEG-2 Partial Transport Stream.

Stream structure:

The PAT of streams shall contain a single programme map PID;

The PMT of streams shall contain a single programme at one time.

System bitrate:

- Up to 48 Mbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	BDA V2.5	QN94E	
---	---	-----	-----	-----	----------	-------	--

9.2.22 MPEG-2 AV format: MPEG-2 video format: TS_HD_DTS_T

9.2.22.1

[PROFILES]

MPEG_TS_HD_DTS_T

9.2.22.2

[GUIDELINE] Main characteristics of video shall be conformant to BDA V2.5.

Main characteristics of MPEG-2 video streams are:

Profiles and levels:

- Main Profile at Main Level;
- Main Profile at High Level.

Table 40 specifies the video encoding parameters for MPEG-2 Video (TS_HD_DTS).

Table 40 – MPEG-2 video encoding parameters (TS_HD_DTS)

Resolution	Aspect ratio	Field (interlaced) or frame (progressive) rate
1 920 × 1 080	16:9	23,976p 24p 50i 59,94i
1 280 × 720	16:9	23,976p 24p 50i 59,94i
720 × 576	4:3, 16:9	50i
720 × 480	4:3, 16:9	59,94i

[ATTRIBUTES]

M	L	n/a	n/a	n/a	BDA V2.5	4E9TD	
---	---	-----	-----	-----	----------	-------	--

9.2.23 MPEG-2 AV format: audio portion profile: TS_HD_DTS_T

9.2.23.1

[PROFILES]

MPEG_TS_HD_DTS_T

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the DTS Digital Surround audio format as specified in 8.2, except as indicated below.

Sampling rate:

- 48 kHz;
- 96 kHz.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	BDA V2.5	B4C56
---	---	-----	-----	-----	----------	-------

9.2.24 MPEG-2 AV format: system portion profile: DIRECTV_SD

9.2.24.1

[PROFILES]

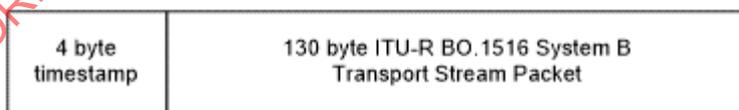
MPEG_DIRECTV_SD_MPEG1_L2

MPEG_DIRECTV_SD_MPEG1_L2_T

9.2.24.2

[GUIDELINE] The main characteristics of this MPEG_DIRECTV_SD_MPEG1_L2 stream are defined in ITU-R Rec BO.1516.A bitstream conformant with this profile shall conform to the system portion of the DIRECTV_SD_MPEG1_L2 profile as defined in 9.2.26 except as indicated below.

Streams with DIRECTV_SD_MPEG1_L2 system profiles that have a "T" (denoting TTS for Timestamped Transport Stream) appended as part of their Profile ID shall be preceded by a 32-bit timestamp to form 134-byte packets as illustrated in Figure 4. The timestamp format is uimbsf (unsigned integer most significant bit first) as defined in ISO/IEC 13818-1:2000.



IEC

Figure 4 – ITU-R Rec. BO.1516 SYSTEM B Transport Stream Packet with TTS support

The 4-byte timestamp field shall represent the 27-MHz clock binary counter value to control the relative input timing to the decoder of the Transport Stream. The 27-MHz clock shall have the same accuracy and precision requirements of an MPEG-2 system clock as defined in ISO/IEC 13818-1:2000.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ITU-R Rec BO.1516	JFJDG
---	---	-----	-----	-----	---	-------

9.2.25 MPEG-2 AV format: video portion profile: DIRECTV_SD**9.2.25.1****[PROFILES]****MPEG_DIRECTV_SD_MPEG1_L2****MPEG_DIRECTV_SD_MPEG1_L2_T****9.2.25.2**

[GUIDELINE] A bitstream conformant with these profiles shall conform to the video portion of the MPEG_TS_SD_NA profile as defined in 9.2.8.3 and 9.2.9.3, except as indicated in Table 41.

Table 41 – MPEG-2 video encoding parameters

Resolution	Aspect ratio	Allowed Field (interlaced) or frame (progressive) rates
720 × 480	4:3	59,94i
704 × 480	4:3	59,94i
544 × 480	4:3	59,94i
480 × 480	4:3	59,94i
352 × 480	4:3	59,94i
352 × 240	4:3	59,94i

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ITU-R Rec BO.1516	S5D9T	
---	---	-----	-----	-----	---	-------	--

9.2.25.3

[GUIDELINE] A bitstream conformant with these profiles may contain Closed Caption information stored in picture header user data according to the syntax shown in Table 42, Table 43 and Table 44.

Table 42 – MPEG-2 video picture header user data

Syntax	No. of bits	Format
user_data() {		
user_data_start_code	32	0x000001B2
while(nextbits() != '0000 0000 0000 0000 0001') {		
user_data_length	8	Uimbsf
user_data_type	8	Uimbsf
if (user_data_type==0xFF)		
ext_user_data_type		8 Uimbsf
user_data_info()	(user_data_length-1)*8	Uimbsf
}		
next_start_code()		
}		

Table 43 – MPEG-2 video user data type

user_data_type value	Type	user_data_length (bytes)
0x02	presentation_time_stamp	1 + 5
0x04	decode_time_stamp	1 + 5
0x09	closed_caption	1 + 2
0x0A	extended_data_services	1 + 2

Table 44 – MPEG-2 video user data info

Syntax	No. of bits	Format
<pre> user_data_info() { switch (user_data_type){ case presentation_time_stamp: six_bit_pad presentation_time_stamp[31..30] marker_bit presentation_time_stamp[29..15] marker_bit presentation_time_stamp[14..0] break case decode_time_stamp: six_bit_pad decode_time_stamp[31..30] marker_bit decode_time_stamp[29..15] marker_bit decode_time_stamp[14..0] case closed_caption: closed_caption_byte1 closed_caption_byte2 break case extended_data_services: extended_data_services_byte1 extended_data_services_byte2 break } </pre>	<p>6</p> <p>2</p> <p>1</p> <p>15</p> <p>1</p> <p>15</p> <p>6</p> <p>2</p> <p>1</p> <p>15</p> <p>1</p> <p>15</p> <p>8</p> <p>8</p> <p>8</p> <p>8</p>	<p>"000000"</p> <p>bslbf</p> <p>"1"</p> <p>bslbf</p> <p>"1"</p> <p>bslbf</p> <p>"000000"</p> <p>bslbf</p> <p>bslbf</p> <p>bslbf</p> <p>"1"</p> <p>bslbf</p> <p>uimsbf</p> <p>uimsbf</p> <p>uimsbf</p> <p>uimsbf</p>

[ATTRIBUTES]

O	L	n/a	n/a	n/a	ISO/IEC 13818-2	4CY67
---	---	-----	-----	-----	-----------------	-------

9.2.26 MPEG-2 AV format: audio portion profile: DIRECTV_SD_MPEG1_L2

9.2.26.1

[PROFILES]

MPEG_DIRECTV_SD_MPEG1_L2

MPEG_DIRECTV_SD_MPEG1_L2_T

9.2.26.2

[GUIDELINE] The main characteristics of this MPEG_DIRECTV_SD audio stream are defined in ISO/IEC 11172-3.

Sampling rate:

- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo);
- A bitstream conformant with this profile may contain a joint stereo encoded audio stream.

Bitrate

- CBR: 56 kbit/s to 384 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 11172-3	79GC4	
---	---	-----	-----	-----	--------------------	-------	--

9.2.27 MPEG-2 AV format: MIME type definition: DIRECTV_SD

9.2.27.1

[PROFILES]

MPEG_DIRECTV_SD_MPEG1_L2

MPEG_DIRECTV_SD_MPEG1_L2_T

9.2.27.2

[GUIDELINE] MIME type "video/vnd.directv.mpeg" shall be used for the MPEG_DIRECTV_SD_MPEG1_L2 Media Format Profile. The MIME type "video/vnd.directv.mpeg-tts" shall be used for the MPEG_DIRECTV_SD_MPEG1_L2_T Media Format Profile.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	J7RS8	
---	---	-----	-----	-----	-----	-------	--

9.3 MPEG-4 Part 10 (AVC) profiling guidelines

9.3.1 Summary of MPEG-4 Part 10 AV format profiles with MPEG-2 TS encapsulation

Table 45 is a summary of MPEG-4 Part 10 profiles for the AV Media Class with MPEG-2 TS encapsulation.

Table 45 – Summary of MPEG-4 Part 10 (AVC) profiles for the AV Media Class with MPEG-2 TS encapsulation

DLNA Profile ID	System portion profile		Video portion profile					Audio portion profile								
	MPEG2-TS_T	MPEG2-TS_ISO	MP_L3	HP_L4	HP_L4.1	SHP_L41	SHP_L4.2	AC3	EAC3	DTS	DTSHD	MPEG1_L2	AAC	HEAAC	HEAACv2_L2	HEAACv2_L4
AVC_TS_NA_T	X		X	X				X	X			X	X	X	X	
AVC_TS_NA_ISO		X	X	X				X	X			X	X	X	X	
AVC_TS_NA_3DFC_ISO		X		X				X	X			X	X	X	X	
AVC_TS_EU_ISO		X	X	X				X	X				X	X	X	X
AVC_TS_EU_3DFC_ISO		X		X				X	X							X
AVC_TS_SD_EU_DTS_ISO		X		X						X						
AVC_TS_HD_EU_DTS_ISO		X		X						X						
AVC_TS_SHP_HD_EU_AC3_T	X		X	X			X	X								
AVC_TS_SHP_HD_EU_HEAACv2_L4_T	X		X	X			X						X	X	X	X
AVC_TS_MP_SD_DTS_ISO		X	X							X						
AVC_TS_MP_SD_DTSHD_ISO		X	X							X	X					
AVC_TS_HP_HD_DTS_ISO		X		X						X						
AVC_TS_HP_HD_DTSHD_ISO		X		X						X	X					
AVC_TS_HP_HD_L41_DTS_ISO		X			X					X						
AVC_TS_HD_DTS_T	X				X					X						
AVC_TS_HD_DTSHD_T	X				X					X	X					
AVC_TS_HD_3D_AC3_ISO		X				X		X								
AVC_TS_HD_3D_DTSHD_ISO		X				X				X	X					

9.3.2 General format guidelines for MPEG-2 Transport Streams

9.3.2.1 MPEG-4 Part 10 AV format: MPEG-2 TS packet format

9.3.2.1.1

[PROFILES]

AVC_TS_NA_T

AVC_TS_NA_ISO

AVC_TS_NA_3DFC_ISO

AVC_TS_EU_ISO

AVC_TS_EU_3DFC_ISO

AVC_TS_SD_EU_DTS_ISO

AVC_TS_HD_EU_DTS_ISO

AVC_TS_SHP_HD_EU_AC3_T

AVC_TS_SHP_HD_EU_HEAACv2_L4_T

AVC_TS_MP_SD_DTS_ISO

AVC_TS_MP_SD_DTSHD_ISO

AVC_TS_HP_HD_DTS_ISO

VC_TS_HP_HD_DTSHD_ISO

AVC_TS_HP_HD_L41_DTS_ISO

AVC_TS_HD_DTS_T

AVC_TS_HD_DTSHD_T

AVC_TS_HD_3D_AC3_ISO

AVC_TS_HD_3D_DTSHD_ISO

9.3.2.1.2

[GUIDELINE] DLNA defines three MPEG-2 TS packet formats as described below:

- 192-B DLNA Transport Packet with a valid 4-B timestamp field and a 188-B MPEG-2 Transport Stream Packet;
- 192-B DLNA Transport Packet with zeros in a 4-B timestamp field and a 188-B MPEG-2 Transport Stream Packet;
- 188-B DLNA Transport Packet without a 4-B timestamp field and a 188-B MPEG-2 Transport Stream Packet.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	6WIVZ	N
---	---	-----	-----	-----	-----	-------	---

9.3.2.2 MPEG-4 Part 10 AV format: MIME type definition for 192-B Transport Packets

9.3.2.2.1

[PROFILES]

- AVC_TS_NA_T
- AVC_TS_SHP_HD_EU_AC3_T
- AVC_TS_SHP_HD_EU_HEAACv2_L4_T
- AVC_TS_HD_DTS_T
- AVC_TS_HD_DTSHD_T

9.3.2.2.2

[GUIDELINE] The MIME type "video/vnd.dlna.mpeg-tts" shall be used for Media Format Profiles that use a 192-B DLNA Transport Packet format.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	WH43W	N
---	---	-----	-----	-----	-----	-------	---

9.3.2.3 MPEG-4 Part 10 AV format: MIME type definition for 188 B Transport Packets

9.3.2.3.1

[PROFILES]

- AVC_TS_NA_ISO
- AVC_TS_NA_3DFC_ISO
- AVC_TS_EU_ISO
- AVC_TS_EU_3DFC_ISO
- AVC_TS_SD_EU_DTS_ISO
- AVC_TS_HD_EU_DTS_ISO
- AVC_TS_MP_SD_DTS_ISO
- AVC_TS_MP_SD_DTSHD_ISO
- AVC_TS_HP_HD_DTS_ISO
- AVC_TS_HP_HD_DTSHD_ISO
- AVC_TS_HP_HD_L41_DTS_ISO
- AVC_TS_HD_3D_AC3_ISO
- AVC_TS_HD_3D_DTSHD_ISO

9.3.2.3.2

[GUIDELINE] The MIME type "video/mpeg" shall be used for Media Format Profiles that use the 188-B DLNA Transport Packet format.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	GHXHB	C
---	---	-----	-----	-----	-----	-------	---

9.3.3 US region-specific TS profiling guidelines

9.3.3.1 MPEG-4 Part 10 AV format: system portion profile: TS_NA

9.3.3.1.1

[PROFILES]

AVC_TS_NA_T

AVC_TS_NA_ISO

AVC_TS_NA_3DFC_ISO

9.3.3.1.2

[GUIDELINE] Main characteristics of this stream are defined in ANSI/SCTE 54:2006/2009 with additional constraints as defined below.

System:

- MPEG-2 Transport Stream.

Number of programs:

- 1 as defined for a Single Programme Transport Stream.

System bitrate:

- Up to 35 Mbit/s (video up to 30 Mbit/s).

Packet size:

- 188 B per Transport Packet.

PSI information:

- PAT and PMT are required. Any other tables shall be tolerated;
- The maximum time interval for the PAT and PMT shall comply with ANSI/SCTE 54:2006/2009;
- The insertion intervals for PSI tables except PAT and PMT are implementation-dependent.

AC-3 and Enhanced AC-3 packetization:

AC-3 and Enhanced AC-3 transmission in a full or partial SPTS shall be according to Part 3 of ATSC Standard A/53:2011.

AC-3 and Enhanced AC-3 packetized Elementary Streams shall conform to the requirements of a private_stream_1, as defined in ISO/IEC 13818-1:2000 and shall have a stream_id value of 0xBD.

An AC-3 packetized Elementary Stream shall have a stream_type value of 0x81.

AC-3 and Enhanced AC-3 Elementary Streams shall be byte-aligned within the MPEG-2 full or partial SPTS. This means the initial 8 bits of an AC-3 or Enhanced AC-3 frame shall reside in a single byte which is carried in the MPEG-2 full or partial SPTS.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ANSI/SCTE 54: 2006/2009 ATSC Standard A/53:2011	E48JX	C
---	---	-----	-----	-----	---	-------	---

9.3.3.1.3

[GUIDELINE] A bitstream conformant with this profile may include the caption_services_descriptor in the PMT as required in ANSI/SCTE 54:2006/2009 and as defined in ATSC Standard A/65. The presence of the caption_services_descriptor indicates that one or more Closed Caption services are present in the bitstream.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 54: 2006/2009 ATSC Standard A/65	PMBMN	
---	---	-----	-----	-----	---	-------	--

9.3.3.1.4

[GUIDELINE] A bitstream conformant with this profile may include the content_advisory_descriptor in the PMT as required in ANSI/SCTE 54:2006/2009.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 54: 2006/2009	WEHDI	
---	---	-----	-----	-----	----------------------------	-------	--

9.3.3.1.5

[GUIDELINE] A bitstream conformant with this profile may include an RRT that corresponds to the content advisory descriptor as defined in ANSI/SCTE 65.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 65	7BM3K	
---	---	-----	-----	-----	--------------	-------	--

9.3.3.1.6

[GUIDELINE] A Rendering Endpoint shall be able to tolerate presence of Content Advisory information in the RRT ANSI/SCTE 65 and the content_advisory_descriptor in the PMT ANSI/SCTE 54:2006/2009.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 65 ANSI/SCTE 54: 2006/2009	46K8D	A
---	---	---------	-------	-----	--	-------	---

9.3.3.1.7

[GUIDELINE] A Rendering Endpoint should be capable of enforcing Content Advisory information, if present in the bitstream and requested by a user.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 54: 2006/2009	GY9YD	A
---	---	---------	-------	-----	----------------------------	-------	---

9.3.3.1.8

[GUIDELINE] A bitstream conformant with this profile may include private data in the adaptation field of the Transport Stream packets as specified in ISO/IEC 13818-1:2000.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 13818-1:2000	P7556	
---	---	-----	-----	-----	-------------------------	-------	--

9.3.3.1.9

[GUIDELINE] A Rendering Endpoint shall be able to tolerate the presence of private data in the adaptation field of Transport Stream packets within the bitstream.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	E9SN2	A
---	---	---------	-------	-----	-----	-------	---

9.3.3.1.10

[GUIDELINE] A Rendering Endpoint shall tolerate but not necessarily render all audio, video and data components that belong to the (selected) programme in a full or partial SPTS according to the PAT/PMT tables. At a minimum, a Rendering Endpoint shall render one elementary video stream and one corresponding elementary audio stream as present in TS.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	5ZWR8	A
---	---	---------	-------	-----	-----	-------	---

[COMMENT] This guideline states a minimum rendering requirement.

9.3.3.1.11

[GUIDELINE] A bitstream conformant with this profile may include ETV interactive signalling services information as defined in OC-SP-ETV-AM1.0.1.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	OC-SP-ETV-A M1.0.1	4WGXB	
---	---	-----	-----	-----	-----------------------	-------	--

[COMMENT] The enhanced TV (ETV) interactive signaling as defined in OC-SP-ETV-AM1.0.1 is used to signal cable interactive services.

9.3.3.1.12

[GUIDELINE] If ETV interactive signaling services information is present in the bitstream, it shall be indicated in the PMT by a stream_type value of 0x05 or 0xC0, in combination with the etv_registration_descriptor (descriptor_tag = 0x05 and etv_format_identifier = "ETV1" (ascii)), etv_integrated_signaling_descriptor (descriptor_tag = 0xA2) and etv_bif_platform_descriptor (descriptor_tag = 0xA1) as defined in OC-SP-ETV-AM1.0.1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	OC-SP-ETV-A M1.0.1	MWCGK	
---	---	-----	-----	-----	-----------------------	-------	--

[COMMENT] The presence of the `etv_integrated_signaling_descriptor` indicates that one or more ETV interactive signaling services are present in the bitstream.

9.3.3.1.13

[GUIDELINE] A bitstream conformant with this profile may include SCTE-35 services information with `stream_type` 0x86 and `cue_identifier_descriptor` (tag = 0x8A) in the PMT as defined in ANSI/SCTE 35. The presence of the `cue_identifier_descriptor` indicates that one or more SCTE-35 services are present in the bitstream.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ANSI/SCTE 35	CUEAD	
---	---	-----	-----	-----	--------------	-------	--

[COMMENT] SCTE-35 messages are used in cable broadcast mainly to signal an event such as a commercial insertion opportunity, where a splicer usually replaces a portion of the programme content with a locally generated content, e.g. local advertisement, short programming, etc.

9.3.3.1.14

[GUIDELINE] A bitstream conformant with this profile may include one or more audio streams that are a translation of the main audio.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 10918-1	WKYDD	
---	---	-----	-----	-----	--------------------	-------	--

9.3.3.1.15

[GUIDELINE] The language of each audio stream shall be indicated by an ISO_639 language descriptor in the PMT ISO/IEC 10918-1. The main audio shall be the first audio stream in the PMT.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 10918-1	778EL	
---	---	-----	-----	-----	--------------------	-------	--

9.3.3.1.16

[GUIDELINE] A bitstream conformant with this profile may include one or more descriptive video service streams as defined in ATSC Standard A/53:2011.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ATSC Standard A/53:2011	SMJ3D	
---	---	-----	-----	-----	----------------------------	-------	--

9.3.3.1.17

[GUIDELINE] The presence of a VI service encoded using AC-3 shall be signaled by setting the bsmo_d parameter in the AC-3 bitstream and in the AC-3_audio_stream_descriptor() to '010', and by setting the full_svc flag =1 in the AC-3_audio_stream_descriptor() to '1', as specified in ATSC Standard A/52:2012.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ATSC Standard A/53:2011 ATSC Standard A/52:2012	YQVGK	
---	---	-----	-----	-----	--	-------	--

9.3.3.1.18

[GUIDELINE] The presence of a VI service encoded using E-AC-3 shall be signaled by setting the bsmo_d parameter in the E-AC-3 bitstream and the service_type field in the E-AC-3_audio_stream_descriptor() to '010', and by setting the full_service_flag in the E-AC-3_audio_stream_descriptor() to '1', as specified in Annex G of ATSC Standard A/52:2012.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ATSC Standard A/53:2011 ATSC Standard A/52:2012	FJQ9J	
---	---	-----	-----	-----	--	-------	--

9.3.3.1.19

[GUIDELINE] A bitstream conformant with this profile may include one or more subtitle services information with stream_type 0x82 in the PMT as defined in ANSI/SCTE 27.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ANSI/SCTE 27	MBVYF	
---	---	-----	-----	-----	--------------	-------	--

9.3.3.2 MPEG-4 Part 10 AV format: system portion profile: TS_NA_3DFC**9.3.3.2.1****[PROFILE]****AVC_TS_NA_3DFC_ISO****9.3.3.2.2**

[GUIDELINE] A bitstream conformant with this profile may include the AVC_Video_descriptor as defined in 2.6.64 of ISO/IEC 13818-1:2007/AMD6:2011, with the Frame_Packing_SEI_not_present_flag set to "0" as per 2.6.65 of ISO/IEC 13818-1:2007/AMD6:2011.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 13818-1:2007/A MD6:2011	J2PT3	
---	---	-----	-----	-----	---------------------------------	-------	--

9.3.3.2.3

[GUIDELINE]

A bitstream conformant with this profile may include the 3d_MPEG2_descriptor as defined in ANSI/SCTE 187-2, or the MPEG2_stereoscopic_video_format_descriptor as defined in ISO/IEC 13818-1:2007/AMD6:2011.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	ISO/IEC 13818-1:2007/AMD 6:2011 ANSI/SCTE 187-2	FVNXR	
---	---	-----	-----	-----	--	-------	--

[COMMENT] A certain amount of MPEG-4 AVC 3D video content was made available before these descriptors were fully defined. As this content may be present in a DLNA network, and advertised using this Profile ID, a Rendering Endpoint that supports this profile should provide manual selection of the proper 3D mode to the consumer. Support for two different descriptors allows content that uses the legacy 3d_MPEG2_descriptor, and content that uses the newer MPEG2_stereoscopic_video_format_descriptor, to be advertised as conforming to this profile.

9.3.3.2.4

[GUIDELINE] A Rendering Endpoint conformant with this profile shall tolerate the presence of the MPEG2_stereoscopic_video_format_descriptor (descriptor tag value of 0x34) and the 3d_MPEG2_descriptor (descriptor tag value of 0xE8) in the PMT of a bitstream that conforms to this profile, as defined in ANSI/SCTE 187-2.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 18 7-2	M45QS	A
---	---	---------	-------	-----	---------------------	-------	---

9.3.3.2.5

[GUIDELINE] A Rendering Endpoint conformant with this profile should be capable of detecting S3D video formats signalled by either the MPEG2_stereoscopic_video_format_descriptor (descriptor tag value of 0x34) or the optional 3d_MPEG2_descriptor (descriptor tag value of 0xE8) in bitstreams that conform to this profile, as specified in ANSI/SCTE 187-2.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ANSI/SCTE 18 7-2	R297C	A
---	---	---------	-------	-----	---------------------	-------	---

9.3.3.3 MPEG-4 Part 10 AV format: video portion profile: TS_NA

9.3.3.3.1

[PROFILES]

AVC_TS_NA_T

AVC_TS_NA_ISO

AVC_TS_NA_3DFC_ISO

9.3.3.3.2

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 14496-10:2003 as constrained by ANSI/SCTE-128:2010, with further constraints as specified below.

Profiles and levels:

- Main Profile at Level 3;
- High Profile at Level 3;
- Main Profile at Level 4;
- High Profile at Level 4.

Chroma:

- 4:2:0.

Video bitrate:

- Main Profile:
 - CBR or VBR: Up to a maximum of 12 Mbit/s for Level 3 Main, as NAL;
 - CBR or VBR: Up to a maximum of 24 Mbit/s for Level 4 Main, as NAL.
- Main Profile:
 - CBR or VBR: Up to a maximum of 15 Mbit/s for Level 3 High, as NAL;
 - CBR or VBR: Up to a maximum of 30 Mbit/s for Level 4 High, as NAL.

Table 46 shows the format resolutions for MPEG-4 Part 10.

Table 46 – MPEG-4 Part 10 AV format resolution

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
1 440 × 1 080	16:9	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
1 280 × 720	16:9	60p, 59,94p, 30p, 29,97p, 24p, 23,976p
720 × 480	16:9, 4:3	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
704 × 480	16:9, 4:3	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
640 × 480	4:3	60i, 59,94i, 30p, 29,97p, 24p, 23,976p
544 × 480	4:3	59,94i, 29,97p, 23,976p
528 × 480	4:3	59,94i, 29,97p, 23,976p
352 × 480	4:3	59,94i, 29,97p, 23,976p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003 ANSI/SCTE-128: 2010	FWMYQ
---	---	-----	-----	-----	--	-------

[COMMENT] Section 7.2 of ANSI/SCTE-128:2010 specifies bit streams compliant to a constrained set of High or Main Profile at Level 3.0, 4.0, or 4.2. This guideline requires complete compliance with definitions in SCTE 128, except the level is constrained to 3.0 and 4.0. Support for level 4.2 is optional.

9.3.3.3.3

[GUIDELINE] A bitstream conformant with this profile may include Closed Caption data with syntax, semantics, and usage rules defined in section 8 of ANSI/SCTE-128:2010, and as shown in Table 47.

Table 47 – ATSC/SCTE AVC SEI syntax for Closed Caption data

Syntax	Value	Bits	Format
user_data_registered_itu_t_t35 () {			
itu_t_t35_country_code	0xB5	8	bslbf
itu_t_t35_provider_code	0x0031	16	bslbf
user identifier	0x47413934	32	bslbf
user_data_type_code	0x03	8	uimbsf
cc_data()		var	
}			

If the itu_t_t35_provider_code is 0x002F, the user identifier and user_structure() of the ATSC/SCTE AVC SEI syntax shall be replaced with the syntax that conforms to Table 48.

Table 48 – AVC Caption Transport Syntax following provider_code = 0x002F

Syntax	Bits	Format
for(i=0; i<N; i++){		
user_data_type_code	8	bslbf
user_data_code_length	8	bslbf
if(user_data_type_code == '0x03')		
cc_data()	var	
else if(user_data_type_code == '0x06')		
bar_data()	var	
}		
}		

[ATTRIBUTES]

O	L	n/a	n/a	n/a	ANSI/SCTE-128: 2010	L3FUI	
---	---	-----	-----	-----	---------------------	-------	--

9.3.3.3.4

[GUIDELINE] A Rendering Endpoint shall tolerate any Closed Caption data within the bitstream that conforms to the syntax shown in Table 47 or Table 48.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	668LS	A
---	---	---------	-------	-----	-----	-------	---

9.3.3.3.5

[GUIDELINE] A Rendering Endpoint should be capable of displaying Closed Captions Streams with syntax as defined in Table 47 or Table 48 and semantics and usage rules as defined in section 8 of ANSI/SCTE-128:2010, if present and requested by a user.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ANSI/SCTE-128:2010	LJZ9H	A
---	---	---------	-------	-----	--------------------	-------	---

9.3.3.4 MPEG-4 Part 10 AV format: video portion profile: TS_NA_3DFC**9.3.3.4.1****[PROFILE]****AVC_TS_NA_3DFC_ISO****9.3.3.4.2**

[GUIDELINE] A bitstream conformant with this profile shall conform to the video portion of the AVC_TS_NA profile as defined in 9.3.3.3.2, except as noted here:

AVC 3DFC video characteristics:

A bitstream conformant with this profile shall be encoded according to one of the 3D-Frame-Compatible formats defined in Table 49.

Table 49 – MPEG-4 Part 10 AV 3DFC Format Resolutions

Resolution	Multiplexing	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 x 1 080	TaB	24p, 23,976p
1 920 x 1 080	SbS	24p, 23,976p
1 920 x 1 080	SbS	60i, 59,94i
1 280 x 720	TaB	60p, 59,94p
1 280 x 720	SbS	60p, 59,94p

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	2B636	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] Top-and-Bottom (TaB) formatting is illustrated by Figure 2 and Side-by-side (SbS) formatting is illustrated by Figure 3.

9.3.3.4.3

[GUIDELINE] If a bitstream conformant with this profile includes the frame_packing_arrangement_type SEI message with the payloadType 0x2D, it shall be formatted as defined by ISO/IEC 14496-10:2010 and further constrained by ANSI/SCTE 187-1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-10:2010 ANSI/SCTE 18 7-1	GA9AW	
---	---	-----	-----	-----	---	-------	--

9.3.3.4.4

[GUIDELINE] A Rendering Endpoint conformant with this profile shall be able to detect the frame_packing_arrangement_type SEI message described in 9.3.3.4.3.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	DG44L	A
---	---	---------	-------	-----	-----	-------	---

9.3.3.5 MPEG-4 Part 10 AV format: audio portion profile: TS_NA

9.3.3.5.1

[PROFILES]

AVC_TS_NA_T

AVC_TS_NA_ISO

AVC_TS_NA_3DFC

9.3.3.5.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of AC-3 audio as specified in 9.3.3.5.3, or Enhanced AC-3 audio as specified in 9.3.3.5.4, or MPEG-4 HE-AAC v2 audio as specified in 9.3.3.5.5, or MPEG-1 Layer II audio as specified in 9.3.3.5.6.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	WL9FR	
---	---	-----	-----	-----	-----	-------	--

9.3.3.5.3

[GUIDELINE] An AC-3 audio bitstream conformant with this profile shall conform to all aspects of the audio portion of the MPEG_TS_SD_NA profile as specified in 9.2.9.6.2,

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	GSNVA	
---	---	-----	-----	-----	-----	-------	--

9.3.3.5.4

[GUIDELINE] An Enhanced AC-3 audio bitstream conformant with this profile shall conform to all aspects of the EAC3 profile as specified in 8.4.1 except as indicated below.

Sampling rate:

- 48 kHz.

Content audio channel modes:

- 1+1 (Dual Monaural);
- 1/0 (Mono);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 3/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel);
- 6.1 (Multichannel);
- 7.1 (Multichannel).

The channel modes listed above may include an LFE channel.

Substream usage:

All substreams shall be encoded at the same sample rate.

All substreams shall be encoded with the same number of audio data blocks per syncframe.

Bitrate:

- CBR or VBR: 32 kbit/s to 3 024 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	49YK3	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] The 3/2 configuration shown above is commonly referred to as 5.1. Enhanced AC-3 supports multiple 6.1 and 7.1-channel configurations. The most common 6.1 channel configuration is 3/3, with an additional rear surround channel. The most common 7.1 channel configuration is 3/4, with two additional rear surround channels.

9.3.3.5.5

[GUIDELINE] An MPEG-4 HE-AAC v2 audio bitstream conformant with this profile shall conform to all aspects of the HEAACv2_L2 profile as specified in 8.9.36, except as indicated below.

Elementary Stream format:

The encoded audio data shall be encapsulated in LATM/LOAS format as defined in 1.7 of ISO/IEC 14496-3:2005.

Sampling rate:

- 48 kHz.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	EKX6Z	
---	---	-----	-----	-----	-----	-------	--

9.3.3.5.6

[GUIDELINE] Main characteristics of this audio stream are defined in ISO/IEC 11172-3.

Sampling rate:

- 32 kHz;
- 44,1 kHz;

- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo);
- A bitstream conformant with these profiles may contain a joint stereo encoded audio stream.

Bitrate:

- CBR or VBR: Up to 384 kbit/s.

Emphasis:

- 0 (No emphasis).

Error protection:

- CRCC shall be included.

Private bit:

- Shall always be set to 0.

Padding:

- No padding is permitted.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 11172-3	SB4C5
---	---	-----	-----	-----	-----------------	-------

9.3.4 European region-specific TS profiling guidelines

9.3.4.1 MPEG-4 Part 10 AV format: system portion profile: TS_EU_ISO

9.3.4.1.1

[PROFILES]

AVC_TS_EU_ISO

9.3.4.1.2

[GUIDELINE] A bitstream conformant with this profile shall comply with 4.1 of ETSI TS 101 154:2012, defining the use of ISO/IEC 13818-1:2000 for IRDs and bitstreams in DVB, and with 9.2.11.2, except for guideline 9.2.11.2.8.

System:

- MPEG-2 Transport Stream.

Numer of programs:

- 1 as defined for a Single Programme Transport Stream.

System bitrate:

- Up to 24 Mbit/s.

Packet size:

- 188 B per Transport Packet.

AC-3 and Enhanced AC-3 packetization:

- AC-3 and Enhanced AC-3 transmission in a full or partial SPTS shall be according to ETSI TS 101 154:2012;

- AC-3 and Enhanced AC-3 packetized Elementary Streams shall conform to the requirements of a private_stream_1, as defined in ISO/IEC 13818-1:2000 and shall have a stream_id value of 0xBD;
- AC-3 and Enhanced AC-3 packetized Elementary Streams shall have a stream_type value of 0x06;
- AC-3 and Enhanced AC-3 Elementary Streams shall be byte-aligned within the full or partial SPTS. This means the initial 8 bits of an AC-3 or Enhanced AC-3 frame shall reside in a single byte which is carried in the full or partial SPTS.

AC-3 and Enhanced AC-3 bitstream identification:

- An AC-3_descriptor as defined in Annex D of ETSI EN 300 468:2009 shall be present in the PMT for each AC-3 packetized Elementary Stream present in the SPTS.
- Enhanced_AC-3_descriptor as defined in Annex D of ETSI EN 300 468:2009 shall be present in the PMT for each Enhanced AC-3 packetized Elementary Streams present in the SPTS.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ETSI TS 101 154:2012 ETSI EN 300 468:2009	BM3EJ	
---	---	-----	-----	-----	---	-------	--

9.3.4.1.3

[GUIDELINE] A Rendering Endpoint shall tolerate, but not necessarily render all audio, video and data components that belong to the (selected) programme in a full or partial SPTS according to the PAT/PMT tables. At a minimum, a Rendering Endpoint shall render one elementary video stream and one corresponding elementary audio stream as present in TS.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	S5MR8	A
---	---	---------	-------	-----	-----	-------	---

9.3.4.1.4

[GUIDELINE] A bitstream conformant with this profile may include Parental Rating information in the Parental Rating Descriptor in the EIT and/or SIT as defined in 6.2.28 of ETSI EN 300 468:2009.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ETSI EN 300 468:2009	GGBPU	
---	---	-----	-----	-----	-------------------------	-------	--

9.3.4.1.5

[GUIDELINE] A Rendering Endpoint should be capable of enforcing Parental Rating information, if present and requested by a user.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ETSI EN 300 468:2009	UCWPY	
---	---	---------	-------	-----	----------------------	-------	--

9.3.4.1.6

[GUIDELINE] A bitstream conformant with this profile may contain subtitles as defined in ETSI EN 300 743.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ETSI EN 300 743	BU347	
---	---	-----	-----	-----	-----------------	-------	--

9.3.4.1.7

[GUIDELINE] Rendering Endpoints shall tolerate, but not necessarily render, DVB subtitles as specified in ETSI EN 300 743.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ETSI EN 300 743	68A3X	
---	---	---------	-------	-----	-----------------	-------	--

9.3.4.1.8

[GUIDELINE] A Rendering Endpoint should be capable of rendering DVB subtitles as specified in ETSI EN 300 743 if they are present.

[ATTRIBUTES]

S	A	DMP DMR	M-DMP	n/a	ETSI EN 300 743	QOUQ9	
---	---	---------	-------	-----	-----------------	-------	--

9.3.4.1.9

[GUIDELINE] A bitstream conformant with this profile may contain DVB teletext as defined in ETSI EN 300 472.

[ATTRIBUTES]

O	C	n/a	n/a	n/a	ETSI EN 300 472	RFMPC	
---	---	-----	-----	-----	-----------------	-------	--

9.3.4.1.10

[GUIDELINE] Rendering Endpoints shall tolerate, but not necessarily render, teletext as specified in ETSI EN 300 472.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ETSI EN 300 472	74OR7	
---	---	---------	-------	-----	--------------------	-------	--

9.3.4.2 MPEG-4 Part 10 AV format: system portion profile: TS_EU_3DFC_ISO**9.3.4.2.1****[PROFILES]****AVC_TS_EU_3DFC_ISO****9.3.4.2.2**

[GUIDELINE] A bitstream conformant to this profile shall conform to Clause 6 of ETSI TS 101 547-2:2012.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 101 547-2:2012 ETSI TS 101 154:2012	SPTLO	N
---	---	-----	-----	-----	--	-------	---

[COMMENT] Clause 6 of ETSI TS 101 547-2:2012 specifies the additions to ETSI TS 101 154:2012 required to correctly support 3DFC content for H.264/AVC IRDs and bitstreams.

9.3.4.3 MPEG-4 Part 10 AV format: video portion profile: TS_EU_ISO**9.3.4.3.1****[PROFILES]****AVC_TS_EU_ISO****9.3.4.3.2**

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 14496-10:2003 as constrained by 5.5, 5.6, and 5.7 of ETSI TS 101 154:2012.

Profiles and levels:

- Main Profile at Level 3;
- High Profile at Level 3;
- Main Profile at Level 4;
- High Profile at Level 4.

Chroma:

- 4:2:0.

Video bitrate:

- Main Profile:
 - CBR or VBR: Up to a maximum of 10 Mbit/s for Level 3 Main, as NAL;
 - CBR or VBR: Up to a maximum of 20 Mbit/s for Level 4 Main, as NAL.
- High Profile:

- CBR or VBR: Up to a maximum of 12,5 Mbit/s for Level 3 High, as NAL;
- CBR or VBR: Up to a maximum of 20 Mbit/s for Level 4 High, as NAL.

Table 50 shows the format resolutions for MPEG-4 Part 10.

Table 50 – MPEG-4 Part 10 AV format resolution

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	50i, 25p
1 440 × 1 080	16:9	50i, 25p
1 280 × 720	16:9	50p, 50i, 25p
960 × 720	16:9	50i, 25p
720 × 576	16:9, 4:3	50i, 25p
704 × 576	16:9, 4:3	50i, 25p
544 × 576	50i, 25p	50i, 25p
480 × 576	50i, 25p	50i, 25p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003 ETSI TS 101 154:2012	DGM4M
---	---	-----	-----	-----	---	-------

9.3.4.3.3

[GUIDELINE] A Serving Endpoint may output resolutions (lower than 1 920 × 1 080) other than those shown in Table 46.

[ATTRIBUTES]

O	A	DMS	M-DMS	n/a	n/a	SUEQ8
---	---	-----	-------	-----	-----	-------

9.3.4.3.4

[GUIDELINE] If a Rendering Endpoint is not capable of rendering certain resolutions in full-screen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	IRL33
---	---	---------	-------	-----	-----	-------

9.3.4.4 MPEG-4 Part 10 AV format: video portion profile: TS_EU_3DFC_ISO

9.3.4.4.1

[PROFILES]

AVC_TS_EU_3DFC_ISO

9.3.4.4.2

[GUIDELINE] A bitstream conformant with this profile shall conform to the constraints specified in Clause 5 of ETSI TS 101 547-2:2012, with further constraints as specified in Table 51.

Table 51 – AVC 3D video format

Resolution	Allowed frame rates	Multiplexing	Display aspect ratio
1080i	25 Hz	SbS	16:9

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 101 547-2:2012	LZ5DF	N
---	---	-----	-----	-----	---------------------------	-------	---

[COMMENT] 25 Hz video system environment.

9.3.4.5 MPEG-4 Part 10 AV format: audio portion profile: TS_EU_ISO**9.3.4.5.1****[PROFILES]****AVC_TS_EU_ISO****AVC_TS_EU_3DFC_ISO****9.3.4.5.2**

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of AC-3 audio as specified in 9.3.4.5.3, or Enhanced AC-3 audio as specified in 9.3.4.5.4 and 6.2.1 of ETSI TS 101 154:2012, or MPEG-4 HE-AAC v2 L4 audio as specified in 8.9.42, except as indicated below.

Elementary Stream encapsulation format:

The MPEG-4 HE-AAC v2 encoded audio data shall be encapsulated in LATM/LOAS format as specified in Section 6.4.1 of ETSI TS 101 154:2012.

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 101 154:2012	OA64K	
---	---	-----	-----	-----	-------------------------	-------	--

9.3.4.5.3

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the AC-3 audio portion of the MPEG_TS_SD_EU profile as specified in 9.2.11.9 and 9.2.11.10, except as indicated below.

The audio codec shall not change in a stream.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	AQEQS	
---	---	-----	-----	-----	-----	-------	--

9.3.4.5.4

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the Enhanced AC-3 audio format as specified in 8.4.1, except as indicated below.

Content audio channel modes:

- Dual Monaural (1 + 1) mode is prohibited.

Bitrate:

- CBR or VBR: 32 kbit/s to 3 024 kbit/s.

Substream usage:

- The Enhanced AC-3 bitstream shall contain a maximum of four independent substreams.

Additional information on substream configuration for the delivery of associated audio services can be found in ETSI TS 101 154:2012.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 101 154:2012	95SZ7	
---	---	-----	-----	-----	-------------------------	-------	--

9.3.4.6 MPEG-4 Part 10 AV format: system portion profile: TS_EU_DTS

9.3.4.6.1

[PROFILES]

AVC_TS_SD_EU_DTS_ISO

AVC_TS_HD_EU_DTS_ISO

9.3.4.6.2

[GUIDELINE] A bitstream conformant with the AVC_TS_SD_EU_DTS_ISO profile shall conform to all aspects of the system portion of the MPEG_TS_SD_EU_ISO profiles respectively, as specified in 9.2.11.1 and 9.2.11.2, except as indicated below.

DTS packetization:

- The presence of the DTS audio PES in the multiplex shall be signaled in accordance with ETSI TS 101 154:2012.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ETSI TS 101 154:2012	KXZIT	
---	---	-----	-----	-----	-------------------------	-------	--

9.3.4.7 MPEG-4 Part 10 AV format: video portion profile: TS_SD_EU_DTS

9.3.4.7.1

[PROFILES]

AVC_TS_SD_EU_DTS_ISO**9.3.4.7.2**

[GUIDELINE] The main characteristics of video shall be conformant to ETSI TS 101 154:2012, 5.5, 5.6.1 and 5.6.2.

Main characteristics of MPEG-4 Part 10 video streams are:

Profiles and levels:

- Main Profile at Level 3;
- High Profile at Level 3.

Video bitrate:

- Up to a maximum of 12 Mbit/s for L3 Main, as NAL;
- Up to a maximum of 15 Mbit/s for L3 High, as NAL.

Table 52 shows the format resolutions for MPEG-4 Part 10.

Table 52 – MPEG-4 Part 10 AV format resolutions

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
720 × 576	4:3, 16:9	25p/50i
544 × 576	4:3, 16:9	25p/50i
480 × 576	4:3, 16:9	25p/50i
352 × 576	4:3, 16:9	25p/50i
352 × 288	4:3, 16:9	25p/50i

A Serving Endpoint may output other resolutions (lower than 720 × 576) for less than full-screen display. Rendering of these resolutions in full-screen format is optional for a DMP. If a DMP is not capable of rendering these resolutions in full-screen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-10:2003 ETSI TS 101 154:2012	YVNSV
---	---	-----	-----	-----	---	-------

9.3.4.8 MPEG-4 Part 10 AV format: video portion profile: TS_HD_EU_DTS**9.3.4.8.1****[PROFILES]****AVC_TS_HD_EU_DTS_ISO****9.3.4.8.2**

[GUIDELINE] Main characteristics of video shall be conformant to ETSI TS 101 154:2012, 5.5, 5.6.1, 5.6.2, 5.7.1 and 5.7.2.

Main characteristics of MPEG-4 Part 10 video streams are:

Profiles and levels:

- Main at Level 3, 3.1, 3.2 or 4;
- High at Level 3, 3.1, 3.2 or 4.

Video bitrate:

- Up to a maximum of 24 Mbit/s for L4 Main, as NAL;
- Up to a maximum of 30 Mbit/s for L4 High, as NAL.

Table 53 shows the format resolutions for MPEG-4 Part 10.

Table 53 – MPEG-4 Part 10 AV format resolutions

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	25p/50i
1 440 × 1 080	16:9	25p/50i
1 280 × 1 080	16:9	25p/50i
960 × 1 080	16:9	25p/50i
1 280 × 720	16:9	25p/50i/50p
960 × 720	16:9	25p/50i/50p
640 × 720	16:9	25p/50i/50p
720 × 576	4:3, 16:9	25p/50i
544 × 576	4:3, 16:9	25p/50i
480 × 576	4:3, 16:9	25p/50i
352 × 576	4:3, 16:9	25p/50i
352 × 288	4:3, 16:9	25p/50i

A Serving Endpoint may output other resolutions (lower than 1 920 × 1 080) for less than full-screen display. Rendering of these resolutions in full-screen format is optional for a DMP. If a DMP is not capable of rendering these resolutions in full-screen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 101 154:2012	ZU3NH
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9.3.4.9 MPEG-4 Part 10 AV format: audio portion profile: TS_EU_DTS

9.3.4.9.1

[PROFILES]

AVC_TS_SD_EU_DTS_ISO

AVC_TS_HD_EU_DTS_ISO

9.3.4.9.2

[GUIDELINE] A bitstream conformant with these profiles shall comply with ETSI TS 101 154:2012.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 101 154:2012	YAS2C	
---	---	-----	-----	-----	-------------------------	-------	--

9.3.4.10 MPEG-4 Part 10 AV format: system portion profile: TS_SHP_HD_EU_T**9.3.4.10.1****[PROFILES]****AVC_TS_SHP_HD_EU_AC3_T****AVC_TS_SHP_HD_EU_HEAACv2_L4_T****9.3.4.10.2**

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the system portion of the MPEG_TS_SD_EU_T profiles respectively, as specified in 9.2.11.1 and 9.2.11.2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	X972P	
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9.3.4.11 MPEG-4 Part 10 AV format: video portion profile: TS_SHP_HD_EU_T**9.3.4.11.1****[PROFILES]****AVC_TS_SHP_HD_EU_AC3_T****AVC_TS_SHP_HD_EU_HEAACv2_L4_T****9.3.4.11.2**

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 14496-10:2003 and 5.8.1, 5.8.2 and 5.8.4 of ETSI TS 101 154:2012. Video bitstreams shall be compliant with Class S Bitstreams, as specified in 5.8.1.1 of ETSI TS 101 154:2012.

Main characteristics of MPEG-4 Part 10 AV format video streams are:

Profiles and levels:

- Scalable High Profile at Level 4 (according to definitions in Annex G.10 of ISO/IEC 14496-10:2003);
- Scalable High Profile at Level 4.2 (according to definitions in Annex G.10 of ISO/IEC 14496-10:2003).

Chroma:

- 4:2:0.

Video bitrate:

- As specified in Annex G.10 of ISO/IEC 14496-10:2003.

Table 54 shows the format resolutions for MPEG-4 Part 10.

Table 54 – MPEG-4 Part 10 AV format resolution

Resolution	Aspect Ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	25p/50i/50p
1 440 × 1 080	16:9	25p/50i
1 280 × 1 080	16:9	25p/50i
960 × 1 080	16:9	25p/50i
1 280 × 720	16:9	25p/50i/50p
960 × 720	16:9	25p/50i/50p
640 × 720	16:9	25p/50i/50p
720 × 576	4:3, 16:9	25p/50i
544 × 576	4:3, 16:9	25p/50i
480 × 576	4:3, 16:9	25p/50i
352 × 576	4:3, 16:9	25p/50i
352 × 288	4:3, 16:9	25p/50i

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-10:2003 ETSI TS 101 154:2012	7TF3X
---	---	-----	-----	-----	---	-------

[COMMENT]

- a) Base Layer bitstreams are backward compatible and compliant with sections 5.8.2 and 5.8.4 of ETSI TS 101 154:2012. Hence the allowed resolutions are 25 Hz H.264/AVC SDTV and 25Hz H.264/AVC HDTV as specified in section 5.8.2.2 and section 5.8.4.2 of ETSI TS 101 154:2012. H.264/AVC bitstreams for the Base Layer are compliant with H.264/AVC High Profile at Level 4 as specified in ISO/IEC 14496-10:2003.
- b) Enhancement Layer bitstreams are compliant with specifications of 5.8.2.1 and 5.8.4.1 of ETSI TS 101 154:2012. Hence the allowed resolutions are 25 Hz H.264/AVC HDTV and 50 Hz H.264/AVC HDTV.

9.3.4.12 MPEG-4 Part 10 AV format: audio portion profile: TS_SHP_HD_EU_AC3

9.3.4.12.1

[PROFILES]

AVC_TS_SHP_HD_EU_AC3_T

9.3.4.12.2

[GUIDELINE] A bitstream conformant with this profile shall conform to the audio portion profile as specified in 9.3.4.5.3.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	TAPQP
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9.3.4.13

9.3.4.14 MPEG-4 Part 10 AV format: audio portion profiling: TS_SHP_HD_EU_HEAACv2_L4_T

9.3.4.14.1

[PROFILES]

AVC_TS_SHP_HD_EU_HEAACv2_L4_T

9.3.4.14.2

[GUIDELINE] Main characteristics of this HEAACv2_L4 audio stream are defined in ISO/IEC 14496-3:2005 and ISO/IEC 14496-3:2005/AMD2:2006.

Audio encoding shall match the provisions for Level 4 in the (MPEG-4) High Efficiency (HE) AACv2 Profile as defined in ISO/IEC 14496-3:2005/AMD2:2006. The appropriate parameter in the file format shall be set to the profiles and level:

- High Efficiency AAC v2 Profile at Level 4.

Additionally, the MPEG-4 AAC Dynamic Range Control (DRC) tool ISO/IEC 14496-3:2005 shall be supported as required in ETSI TS 101 154:2012, Clause H.5 and ETSI TS 102 005:2006, 6.1.5.

AAC sampling rate (SBR present):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz (mono/stereo only);
- 44,1 kHz (mono/stereo only);
- 48 kHz (mono/stereo only).

AAC sampling rate (SBR not present):

- 8 kHz;
- 11,025 kHz;
- 12 kHz;
- 16 kHz;
- 22,05 kHz;
- 24 kHz;
- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Maximum bitrate (informative):

- 1 440 kbit/s.

Content audio channel modes:

- Mono (1);
- Stereo (2);
- Parametric Stereo (2) as defined in ISO/IEC 14496-3:2009;
- Multichannel (3);
- Multichannel (4);
- Multichannel (5).

The channel modes listed above may include an LFE channel.

The channel mode may change within the bitstream.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-3:2005/A MD2:2006	M75VD
---	---	-----	-----	-----	---------------------------------------	-------

[COMMENT]

- a) The number of channels can change during a content item.
- b) The maximum bitrate is defined by the following equation in ISO/IEC 14496-3:2005:
maximum bitrate = (6 144/1 024) × maximum sampling rate × number of channels.

9.3.5 MPEG-4 Part 10 AV format: system portion profile: TS_MP_SD_DTS

9.3.5.1

[PROFILES]

AVC_TS_MP_SD_DTS_ISO

AVC_TS_MP_SD_DTSHD_ISO

9.3.5.2

[GUIDELINE] The main characteristics of video stream shall be conformant to ISO/IEC 13818-1:2000.

Main characteristics of MPEG-4 part 10 system stream are:

System:

- MPEG-2 Transport Stream.

Number of programs:

- 1 as defined for a Single Programme Transport Stream.

Packet size:

- 188 B per Transport Packet.

System bitrate:

- Up to 12 Mbit/s (video up to 10 Mbit/s).

PSI information:

- PAT and PMT are required.
- The maximum time interval for the PAT and PMT shall not exceed 140 ms.
- The time intervals for PSI tables except PAT and PMT are implementation-dependent.

Bitstreams conformant with these profiles may contain additional PSI information.

DLNA Transport Packets:

- A bitstream conformant to these Media Format Profiles shall contain DLNA Transport Packets as defined in 9.2.7.1.2 and 9.2.8.4.2.

Bitstream packetization:

- DTS and DTS-HD bitstreams shall be packed into PES packets as "private_stream_1".

Bitstream identification:

- The presence of DTS and DTS-HD audio PESs in the multiplex shall be signaled as defined in ETSI TS 102 114.

DTS registration descriptor:

In a Transport Stream environment, a registration descriptor with a registered format identifier is required to identify the DTS and DTS-HD formats. The syntax of the DTS registration descriptor is shown in Table 55.

Table 55 – DTS registration descriptor syntax

Syntax	No. of bits	Value
registration_descriptor() {		
descriptor_tag	8	0x05
descriptor_length	8	0x04
format_identifier	32	see Table 56
}		

This descriptor shall be included in the descriptor loop immediately following the ES_info_length field in the TS_program_map_section describing the DTS or DTS-HD Elementary Stream.

For the DTS and DTS-HD formats, unique format_identifier values have been assigned to represent different audio frame durations. See Table 56 for a list of these codecs.

Table 56 – DTS and DTS-HD format identifier values

Label	format_identifier	Audio frame duration (samples)
DTS1	0x44545331	512
DTS2	0x44545332	1 024
DTS3	0x44545333	2 048
DTSH	0x44545348	Various, see audio stream identifier

Audio stream descriptors:

The DTS audio stream descriptor is defined in ETSI TS 102 114, and contains information on sample rate, bitrate, frame size, surround mode and so on. This descriptor is associated with formats indicated by DTS1, DTS2, and DTS3 format identifiers in the DTS registration descriptor. This format may be used when only a core substream is present.

The DTS-HD audio stream descriptor is defined in ETSI TS 102 114, and contains information on sample rate, bitrate, frame size, surround mode and so on for core and substreams. This descriptor is associated with the DTSH format identifier. This format shall be used for all audio streams consisting of a core and extension, such as DTS-HD Master Audio, and streams containing only an extension substream, such as DTS Express. Since DTS audio is a subset of DTS-HD, DTS formats may also use DTS-HD descriptor.

The appropriate audio stream descriptor shall be included in the TS_program_map_section descriptor loop immediately following the DTS registration_descriptor.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ETSI TS 102 114	UT9K3	C
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[COMMENT] A full or partial SPTS can have multiple audio and video components in it.

9.3.6 MPEG-4 Part 10 AV format: system portion profiling: TS_HP_HD_DTS

9.3.6.1

[PROFILES]

AVC_TS_HP_HD_DTS_ISO

AVC_TS_HP_HD_DTSHD_ISO

AVC_TS_HP_HD_L41_DTS_ISO

9.3.6.2

[GUIDELINE] The main characteristics of video stream shall be conformant to ISO/IEC 13818-1:2000.

Main characteristics of MPEG-4 part 10 system stream are:

System:

- MPEG-2 Transport Stream.

Number of programs:

- 1 as defined for a Single Programme Transport Stream.

Packet size:

- 188 B per Transport Packet.

System bitrate:

- Up to 25 Mbit/s (video up to 20 Mbit/s).

PSI information:

- PAT and PMT are required. It shall tolerate any other tables.
- The maximum time interval for the PAT and PMT shall not exceed 140 ms.
- The time intervals for PSI tables except PAT and PMT are implementation-dependent.

Bitstream packetization:

- DTS and DTS-HD bitstreams shall be packed into PES packets as "private_stream_1".

Bitstream identification:

- The presence of DTS and DTS-HD audio PESs in the multiplex shall be signaled as defined in ETSI TS 102 114.

DTS registration descriptor:

In a Transport Stream environment, a registration descriptor with a registered format identifier is required to identify the DTS and DTS-HD formats. The syntax of the DTS registration descriptor is shown in Table 57.

Table 57 – DTS registration descriptor syntax

Syntax	No. of bits	Value
registration_descriptor() {		
descriptor_tag	8	0x05
descriptor_length	8	0x04
format_identifier	32	see Table 58
}		

This descriptor shall be included in the descriptor loop immediately following the ES_info_length field in the TS_program_map_section describing the DTS or DTS-HD Elementary Stream.

For the DTS and DTS-HD formats, unique format_identifier values have been assigned to represent different audio frame durations. See Table 58 for a list of these codecs.

Table 58 – DTS and DTS-HD format identifier values

Label	format_identifier	Audio frame duration (samples)
DTS1	0x44545331	512
DTS2	0x44545332	1 024
DTS3	0x44545333	2 048
DTSH	0x44545348	Various, see audio stream identifier

Audio Stream Descriptors:

The DTS audio stream descriptor is defined in ETSI TS 102 114, and contains information on sample rate, bitrate, frame size, surround mode and so on. This descriptor is associated with formats indicated by DTS1, DTS2, and DTS3 format identifiers in the DTS registration descriptor. This format may be used when only a core substream is present.

The DTS-HD audio stream descriptor is defined in ETSI TS 102 114, and contains information on sample rate, bitrate, frame size, surround mode and so on for core and substreams. This descriptor is associated with the DTSH format identifier. This format shall be used for all audio streams consisting of a core and extension, such as DTS-HD Master Audio, and streams containing only an extension substream, such as DTS Express. Since DTS audio is a subset of DTS-HD, DTS formats may also use DTS-HD descriptor.

The appropriate audio stream descriptor shall be included in the TS_program_map_section descriptor loop immediately following the DTS registration_descriptor.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 13818-1:2000 ETSI TS 102 114	VBWHK	C
---	---	-----	-----	-----	---	-------	---

[COMMENT] A full or partial SPTS can have multiple audio and video components in it.

9.3.7 MPEG-4 Part 10 AV format: video portion profile: TS_HP_HD_DTS

9.3.7.1

[PROFILES]

AVC_TS_HP_HD_DTS_ISO

AVC_TS_HP_HD_DTSHD_ISO

AVC_TS_HP_HD_L41_DTS_ISO

9.3.7.2

[GUIDELINE] Main characteristics of video shall be conformant to ISO/IEC 14496-10:2003. Additionally, these video streams shall conform to the specifications for MPEG-4 AVC HDTV bit streams as defined in ETSI TS 101 154:2012, Clause 5, except that Main Profile streams are also permitted.

Main characteristics of MPEG-4 Part 10 video streams are:

Profiles and levels:

- Main Profile at Level 3, 3.1, 3.2 or 4;
- High Profile at Level 3, 3.1, 3.2 or 4.

Video bitrate:

- Up to a maximum of 24 Mbit/s for L4 Main;
- Up to a maximum of 30 Mbit/s for L4 High, as NAL.

Chroma:

- 4:2:0.

Resolution:

- Any luminance resolution allowed by the applied H.264/AVC Profile and level may be used.
- Any sample and picture aspect ratio allowed by the applied H.264/AVC Profile and level may be used.
- A bit stream conformant with these Media Format Profiles may use any of these pixel aspect ratios regardless of resolutions.

The Rendering Endpoint may ignore the pixel aspect ratio for rendering.

The Rendering Endpoint may map the image to the display dependent on the vendor implementations.

Resolution may change in a video stream.

Frame rate:

- 23,976 (progressive);
- 24 (progressive);
- 25 (interlaced or progressive);
- 29,97 (interlaced or progressive);
- 30 (interlaced or progressive);
- 50 (progressive);
- 59,94 (progressive);

- 60 (progressive).

The frame rate may change in a video stream.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-10:2003 ETSI TS 101 154:2012	QZU3N	
---	---	-----	-----	-----	---	-------	--

9.3.8 MPEG-4 Part 10 AV format: video portion profile: TS_HP_HD_L41_DTS

9.3.8.1

[PROFILES]

AVC_TS_HP_HD_L41_DTS_ISO

9.3.8.2

[GUIDELINE] A bitstream conformant with these profiles shall conform to the video portion of the profiles as defined in 9.3.7 with addition of:

Profiles and level:

- Up to High Profile at Level 4.1.

Video bitrate:

- Up to 30 Mbit/s for High Profile at Level 4.1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	LRCCJ	
---	---	-----	-----	-----	-----	-------	--

9.3.9 MPEG-4 Part 10 AV format: audio portion profile: TS_DTS

9.3.9.1

[PROFILES]

AVC_TS_MP_SD_DTS_ISO

AVC_TS_HP_HD_DTS_ISO

AVC_TS_HP_HD_L41_DTS_ISO

9.3.9.2

[GUIDELINE] A bitstream conformant with these profiles shall comply with ETSI TS 102 114, and may also contain DTSHD audio data that complies with ETSI TS 102 114.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ETSI TS 102 114	B6WJB	
---	---	-----	-----	-----	--------------------	-------	--

9.3.9.3

[GUIDELINE] Rendering Endpoints that are conformant to these profiles may ignore any DTSHD audio data present in the bitstream.

[ATTRIBUTES]

O	A	DMP DMR	M-DMP	n/a	n/a	NYMBB	A
---	---	---------	-------	-----	-----	-------	---

9.3.10 MPEG-4 Part 10 AV format: audio portion profile: TS_DTSHD

9.3.10.1

[PROFILES]

AVC_TS_MP_SD_DTSHD_ISO

AVC_TS_HP_HD_DTSHD_ISO

9.3.10.2

[GUIDELINE] A bitstream conformant with this profile shall comply with ETSI TS 102 114.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ETSI TS 102 114	5CNWY	
---	---	-----	-----	-----	-----------------	-------	--

9.3.11 MPEG-4 Part 10 AV format: system portion profile: TS_HD

9.3.11.1

[PROFILES]

AVC_TS_HD_DTS_T

AVC_TS_HD_DTSHD_T

AVC_TS_HD_3D_AC3_ISO

AVC_TS_HD_3D_DTSHD_ISO

9.3.11.2

[GUIDELINE] Main characteristics of this AVC_TS_HD stream are defined in BDA V2.5.

Main characteristics of MPEG-4 Part 10 system stream are:

System:

- MPEG-2 Partial Transport Stream.

Stream structure:

- The PAT of streams shall contain a single programme map PID;
- The PMT of streams shall contain a single programme at one time.

System bitrate:

- Up to 48 Mbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	BDA V2.5	D2ZHA	C
---	---	-----	-----	-----	----------	-------	---

9.3.12 MPEG-4 Part 10 AV format: video portion profile: TS_HD**9.3.12.1****[PROFILES]**

AVC_TS_HD_DTS_T

AVC_TS_HD_DTSHD_T

9.3.12.2**[GUIDELINE]** Main characteristics of video shall be conformant to BDA V2.5.

Main characteristics of MPEG-4 Part 10 video streams are:

Profiles:

- High Profile;
- Main Profile.

Levels:

- Level 4.1 or 4 in case of 1 920 × 1 080, 1 440 × 1 080, and 1 280 × 720;
- Level 4.1, 4, 3.2, 3.1 or 3 in case of 720 × 480 and 720 × 576.

Table 59 shows the format resolutions for MPEG-4 Part 10.

Table 59 – MPEG-4 Part 10 AV format resolutions

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	23,976p 24p 50i 59,94i
1 440 × 1 080	16:9	23,976p 24p 50i 59,94i
1 280 × 720	16:9	23,976p 24p 50p 59,94p
720 × 576	4:3, 16:9	50i
720 × 480	4:3, 16:9	59,94i

[ATTRIBUTES]

M	R	n/a	n/a	n/a	BDA V2.5	67DP7	C
---	---	-----	-----	-----	----------	-------	---

9.3.13 MPEG-4 Part 10 AV format: video portion profile: TS_HD_3D

9.3.13.1

[PROFILES]

AVC_TS_HD_3D_AC3_ISO

AVC_TS_HD_3D_DTSHD_ISO

9.3.13.2

[GUIDELINE] Main characteristics of video shall be conformant to ISO/IEC 14496-10:2010 as constrained by BDA V2.5.

Main characteristics of MPEG-4 Part 10 AV format video streams are:

Profiles and level:

- As defined in section P.9.3 of BDA V2.5.

Chroma:

- According to section 9.5 of BDA V2.5.

Video bitrate:

- As defined in section P.9.3.4 of BDA V2.5.

Resolution:

- According to Table P-12 of BDA V2.5 and as shown in Table 60.

Table 60 – MPEG-4 Part 10 AV 3D Format Resolutions

Resolution	Display Aspect Ratio	Allowed Frame Rates
1920 × 1080	16:9	23.976p
1280 × 720	16:9	59.94p
1280 × 720	16:9	50p

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-10:2010 BDA V2.5	QI4VG	N
---	---	-----	-----	-----	--------------------------------	-------	---

9.3.14 MPEG-4 Part 10 AV format: audio portion profile: TS_HD_DTS_T

9.3.14.1

[PROFILES]

AVC_TS_HD_DTS_T

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the DTS digital surround audio format as specified in 8.2.1, except as indicated below.

Sampling rate:

- 48 kHz;
- 96 kHz.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	BDA V2.5	QEQSV	
---	---	-----	-----	-----	----------	-------	--

9.3.15 MPEG-4 Part 10 AV format: audio portion profile: TS_HD_DTSHD_T**9.3.15.1****[PROFILES]****AVC_TS_HD_DTSHD_T****9.3.15.2**

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the DTS-HD audio format as specified in 8.3.1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	7HNF4	N
---	---	-----	-----	-----	-----	-------	---

9.3.16 MPEG-4 Part 10 AV format: audio portion profile: TS_HD_3D_AC3**9.3.16.1****[PROFILES]****AVC_TS_HD_3D_AC3_ISO****9.3.16.2**

[GUIDELINE] The main characteristics of this AVC_TS_HD_AC3 audio stream are defined in BDA V3.01, 4.4 or BDA V2.11, Clause 13.

Sampling rate:

- 48 kHz.

Content audio channel modes:

A bitstream conformant to these Media Format Profiles may contain the following formats that may also include a Low Frequency Effects (LFE) channel:

- 1/0 (Mono);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 3/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel).

Bitrate:

- 64 kbit/s to 640 kbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	BDA V3.01 BDA V2.11	G9QR8
---	---	-----	-----	-----	------------------------	-------

9.3.17 MPEG-4 Part 10 AV format: audio portion profile: TS_HD_3D_DTSHD_ISO

9.3.17.1

[PROFILES]

AVC_TS_HD_3D_DTSHD_ISO

9.3.17.2

[GUIDELINE] A bitstream conformant with this profile shall conform to one of the following:

- DTS as defined in 8.2.1;
- DTSHD as defined in 8.3.1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	LN7XI	N
---	---	-----	-----	-----	-----	-------	---

9.3.18 Summary of MPEG-4 Part 10 AV format profiles with MP4 encapsulation

Table 61 is a summary of MPEG-4 Part 10 profiles for the AV Media Class with MP4 encapsulation.

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Table 61 – Summary of MPEG-4 Part 10 (AVC) profiles for the AV Media Class with MP4 encapsulation

DLNA Profile ID	System portion profile	Video portion profile						Audio portion profile									
	MP4	BL_CIF15	BL_L2	CBP_L3	CBP_L4	MP_L3	MP_L4	HP_L4	AC3	DTS	DTSHD	EAC3	MLP	AAC	HEAAC	HEAACv2	HEAACv2_L6
AVC_MP4_EU	X								X			X		X	X	X	
AVC_MP4_BL_CIF15_AAC_520	X	X												X			
AVC_MP4_MP_SD	X			X		X								X			
AVC_MP4_HP_HD	X			X	X	X	X	X						X			
AVC_MP4_BL_DTS	X		X							X							
AVC_MP4_BL_DTSHD	X		X								X						
AVC_MP4_MP_SD_DTS	X					X				X							
AVC_MP4_MP_SD_DTSHD	X					X					X						
AVC_MP4_HP_HD_DTS	X							X		X							
AVC_MP4_HP_HD_DTSHD	X							X			X						
AVC_MP4_MP_SD_EAC3	X					X			X			X		X	X	X	
AVC_MP4_HP_HD_EAC3	X							X	X			X		X	X	X	
AVC_MP4_HP_HD_MLP	X			X	X	X	X	X					X	X	X	X	X
AVC_MP4_HD_HEAACv2_L6	X							X						X	X	X	X

9.3.19 General format guidelines for MP4 files

9.3.19.1 MPEG-4 Part 10 AV format: systems portion profile: Constraints on the MP4 file format

9.3.19.1.1

[PROFILES]

AVC_MP4_BL_CIF15_AAC_520

AVC_MP4_EU

AVC_MP4_MP_SD_EAC3

AVC_MP4_HP_HD_EAC3

AVC_MP4_HD_HEAACV2_L6

9.3.19.1.2

[GUIDELINE] One default video track and one default audio track shall be present.

The default video track shall contain Video Elementary Stream for this Media Format Profile.

The default audio track shall contain Audio Elementary Stream for this Media Format Profile.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	4W4QE	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.19.1.3

[GUIDELINE] The Rendering Endpoint shall be able to render at least the default video track and the default audio track.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	ISO/IEC 14496-12:2004	T76KX	
---	---	---------	-------	-----	--------------------------	-------	--

[COMMENT] In addition to the default video track and the default audio track, the Rendering Endpoint might support the rendering of additional tracks as defined in 9.3.19.1.6. The rendering of additional tracks is vendor-dependent.

9.3.19.1.4

[GUIDELINE] The default video track shall have the lowest track ID among the video tracks contained in the content object.

The default audio track shall have the lowest track ID among the audio tracks contained in the content binary.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2004	8TT9U	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] This guideline defines a DLNA normative method to identify a video track and an audio track for default representation instead of using the Object Descriptor Box.

9.3.19.1.5

[GUIDELINE] For the default video track and the default audio track, "Track_enabled" shall be set to the value of 1 in the "flags" field of Track Header Box of the track.

[ATTRIBUTES]

M	C	n/a	n/a	n/a	ISO/IEC 14496-12:2004	T9U3Z	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] See ISO/IEC 14496-14:2003, 5.3. "The track header flags track_in_movie and track_in_preview are not used in MP4 and shall be set to the default value of 1 in all files".

9.3.19.1.6

[GUIDELINE] Tracks other than the default video and audio tracks may be present in the content object.

NOTE Additional tracks might not be compliant to the Elementary Streams for the Media Format Profile.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004	W4QE7	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] Additional tracks can be BIFS track, optional audio tracks, optional video tracks, text track, and hint track.

9.3.19.1.7

[GUIDELINE] The Rendering Endpoint shall be tolerant of additional tracks other than the default video and audio tracks.

[ATTRIBUTES]

M	L	DMP DMR	M-DMP	n/a	ISO/IEC 14496-12:2004	78TT9	
---	---	---------	-------	-----	--------------------------	-------	--

9.3.19.1.8

[GUIDELINE] The 'moov' box shall be positioned after the 'ftyp' box before the first 'mdat'. If a 'moof' box is present, it shall be positioned before the corresponding 'mdat' box.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	PUT9K	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] For streaming, moov is retrieved at first in consideration of streaming playback.

9.3.19.1.9

[GUIDELINE] Within a track, chunks shall be in decoding time order within the media-data box mdat.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2004	Y3VBW	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.19.1.10

[GUIDELINE] Video and audio tracks shall be organized as interleaved chunks.

The duration of samples stored in a chunk shall not exceed 1 s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	XN44B	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] A resource constrained system cannot process a big chunk.

9.3.19.1.11

[GUIDELINE] If the size of moov box becomes bigger than 1 MiB, the MPEG-4 movie shall be fragmented by using moof box.

The size of moov boxes shall be equal to or less than 1 MiB

The size of moof boxes shall be equal to or less than 300 KiB.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	HZNXQ
---	---	-----	-----	-----	--------------------------	-------

[COMMENT]

- a) A resource-constrained system cannot process a big moov box in case of streaming. The 300 KiB moof box can store the sample table box corresponding to about 20 min of AV stream if each video picture is stored as a chunk.
- b) A big moov box can cause an initial delay to start rendering the AV stream.
- c) A small movie fragment can cause slow random access when the downloaded file is played back locally.

9.3.19.1.12

[GUIDELINE] For video, random accessible samples should be stored as the first sample of each 'traf'. In the case of gradual decoder refresh, a random accessible sample and the corresponding recovery point should be stored in the same movie fragment. If audio is present, samples having the closest presentation time for every accessible random video sample should be stored as the first sample of each traf. Hence, the first samples of each media in the moof have approximately equal presentation times.

[ATTRIBUTES]

S	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	ZNXQ4
---	---	-----	-----	-----	--------------------------	-------

9.3.19.1.13

[GUIDELINE] The sample size box (stsz) shall be used. The compact sample size box (stz2) shall not be used.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	NXQ47
---	---	-----	-----	-----	--------------------------	-------

9.3.19.1.14

[GUIDELINE] Only Media Data Box (mdat) is allowed to have size equal to 1. Only the last Media Data Box (mdat) in the file is allowed to have size equal to 0. Other boxes shall not have size equal to 1.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-12:2004	XQ47Q
---	---	-----	-----	-----	--------------------------	-------

[COMMENT] ISO/IEC 14496-12:2004, 4.2 implies this requirement as follows; "size is an integer that specifies the number of bytes in this box, including all its fields and contained boxes; if size is 1, then the actual size is in the field largesize. If size is 0, then this box is the last one in the file, and its contents extend to the end of the file (normally only used for a Media Data Box)".

9.3.19.1.15

[GUIDELINE] When a group of multiple tracks that contain alternate data for one another exists as part of a content binary, the value of the `alternate_group` field for each of these tracks should be the same non-zero value. When multiple instances of such groups exist, each group should have a distinct `alternate_group` value.

[ATTRIBUTES]

S	R	n/a	n/a	n/a	ISO/IEC 14496-12:2004	8Q9RH
---	---	-----	-----	-----	--------------------------	-------

[COMMENT] For example, this indicates that the multiple audio or video tracks are alternatives to each other (and are not intended to be mixed).

9.3.19.2 MPEG-4 Part 10 AV format: MIME type definition, MP4

9.3.19.2.1

[PROFILES]

AVC_MP4_EU

AVC_MP4_BL_CIF15_AAC_520

AVC_MP4_MP_SD

AVC_MP4_HP_HD

AVC_MP4_BL_DTS

AVC_MP4_BL_DTSHD

AVC_MP4_MP_SD_DTS

AVC_MP4_MP_SD_DTSHD

AVC_MP4_MP_SD_EAC3

AVC_MP4_HP_HD_DTS

AVC_MP4_HP_HD_DTSHD

AVC_MP4_HP_HD_EAC3

AVC_MP4_HP_HD_MLP

AVC_MP4_HD_HEAACV2_L6

9.3.19.2.2

[GUIDELINE] MIME type "video/mp4" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	8BJYV
---	---	-----	-----	-----	-----	-------

9.3.20 European region-specific MP4 profiling guidelines

9.3.20.1 MPEG-4 Part 10 AV format: system portion profile: MP4_EU

9.3.20.1.1

[PROFILES]

AVC_MP4_EU

9.3.20.1.2

[GUIDELINE] A bitstream conformant with this profile shall comply with ISO/IEC 14496-14:2003, ISO/IEC 14496-12:2004, ISO/IEC 14496-15:2004, Annex F of ETSI TS 102 366:2014, and the constraints defined in 9.3.19.1, except for 9.3.19.1.4. The following additional constraints also apply.

- The largesize defined in 4.2 of ISO/IEC 14496-12:2004 shall not be used.
- The stco box defined in 8.19 of ISO/IEC 14496-12:2004 shall be used.
- The co64 box defined in 8.19 of ISO/IEC 14496-12:2004 shall not be used.
- Use of the pdin box defined in 8.43 of ISO/IEC 14496-12:2004 is recommended.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 ISO/IEC 14496-15:2004 ETSI TS 102 366:2014	2J3RC
---	---	-----	-----	-----	---	-------

9.3.20.2 MPEG-4 Part 10 AV format: video portion profile: MP4_EU

9.3.20.2.1

[PROFILES]

AVC_MP4_EU

9.3.20.2.2

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 14496-10:2003 as constrained by sections 5.5, 5.6, and 5.7 of ETSI TS 101 154:2012, and the additional constraints defined below.

Profiles and levels:

- Main Profile at Level 3;
- High Profile at Level 3;
- Main Profile at Level 4;
- High Profile at Level 4.

Chroma:

- 4:2:0.

Video bitrate:

- Constrained Profile:

- CBR or VBR: Up to a maximum of 768 kbit/s for Level 1.3.
- Main Profile:
 - CBR or VBR: Up to a maximum of 10 Mbit/s for Level 3 Main;
 - CBR or VBR: Up to a maximum of 20 Mbit/s for Level 4 Main.
- High Profile:
 - CBR or VBR: Up to a maximum of 12.5 Mbit/s for Level 3 High;
 - CBR or VBR: Up to a maximum of 20 Mbit/s for Level 4 High.

Table 62 shows the format resolutions for MPEG-4 Part 10.

Table 62 – MPEG-4 Part 10 AV format resolution

Resolution	Aspect Ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	50i,
1 440 × 1 080	16:9	50i, 25p
1 280 × 720	16:9	50p, 50i, 25p
960 × 720	16:9	50i, 25p
720 × 576	16:9, 4:3	50i, 25p
704 × 576	16:9, 4:3	50i, 25p
544 × 576	50i, 25p	50i, 25p
480 × 576	50i, 25p	50i, 25p
320 × 240	4:3	25p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003 ETSI TS 101 154:2012	OTQPY
---	---	-----	-----	-----	---	-------

9.3.20.2.3

[GUIDELINE] A Serving Endpoint may output resolutions (lower than 1 920 × 1 080) other than those shown in Table 62.

[ATTRIBUTES]

O	A	DMS	M-DMS	n/a	n/a	VAZS2
---	---	-----	-------	-----	-----	-------

9.3.20.2.4

[GUIDELINE] If a Rendering Endpoint is not capable of rendering certain resolutions in full-screen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	K9I4E	A
---	---	---------	-------	-----	-----	-------	---

9.3.20.3 MPEG-4 Part 10 AV format: audio portion profile: MP4_EU

9.3.20.3.1

[PROFILES]

AVC_MP4_EU

9.3.20.3.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of Enhanced AC-3 audio as specified in 9.3.4.5.4 and in 6.2.1 of ETSI TS 101 154:2012, or MPEG-4 HE-AAC v2 L4 audio as specified in 8.9.42, except as indicated below.

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 101 154:2012	YRWG4	
---	---	-----	-----	-----	-------------------------	-------	--

[COMMENT] For Multichannel content, the HEAACv2 L4 audio format is identical to the HEAAC_L4 audio format. The only difference between the two formats is the Parametric Stereo (PS) audio coding tool of HE-AAC v2 that only applies to stereo content.

9.3.21 MPEG-4 Part 10 AV format: systems portion profile: MP4_BL_CIF15

9.3.21.1

[PROFILES]

AVC_MP4_BL_CIF15_AAC_520

[GUIDELINE] A bitstream conformant to these profiles shall conform to the provisions defined by MPEG-4 Part 14, ISO/IEC 14496-14:2003, and Part 15, ISO/IEC 14496-15:2004, and the additional constraints defined in guideline 9.3.19.1.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-15:2004	A46OA	
---	---	-----	-----	-----	--	-------	--

9.3.21.2

[GUIDELINE] A bitstream conformant to these profiles shall meet the following requirements.

Maximum bitrate:

- 520 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	TPACY	
---	---	-----	-----	-----	-----	-------	--

9.3.22 MPEG-4 Part 10 AV format: video portion profile: MP4_BL_CIF15

9.3.22.1

[PROFILES]

AVC_MP4_BL_CIF15_AAC_520

[GUIDELINE] The main characteristics of video stream shall be conformant to ISO/IEC 14496-10:2003.

Main characteristics of MPEG-4 part 10 video streams are:

Profiles and level:

- BP at the following levels:
- L1.2 and below.

Chroma:

- 4:2:0.

Video bitrate:

Baseline Profile:

Constant bitrate equal to or less than 384 kbit/s;

Variable-maximum bitrate equal to or less than 384 kbit/s.

Maximum video bitrate (normative):

- 384 kbit/s.

Table 63 shows the format resolutions for MPEG-4 Part 10.

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Table 63 – MPEG-4 Part 10 AV format resolutions

	Resolution	Pixel aspect ratio ^a (informative)	Display aspect ratio ^b (informative)	Max. frame rate
CIF, 625SIF	352 × 288	12:11	4:3	15
	352 × 288	16:11	16:9	15
525SIF	352 × 240	10:11	4:3	18
	352 × 240	40:33	16:9	18
QVGA 4:3	320 × 240	1:1	4:3	20
QVGA 16:9	320 × 180	1:1	16:9	26
1/7VGA 4:3	240 × 180	1:1	4:3	30
1/7VGA 16:9	240 × 135	1:1	16:9	30
1/9VGA 4:3	208 × 160	1:1	4:3	30
QCIF, 625QSIF	176 × 144	12:11	4:3	30
	176 × 144	16:11	16:9	30
525QSIF	176 × 120	10:11	4:3	30
	176 × 120	40:33	16:9	30
SQVGA 4:3	160 × 120	1:1	4:3	30
1/16 VGA 4:3	160 × 112	1:1	4:3	30
SQVGA 16:9	160 × 90	1:1	16:9	30
SQCIF	128 × 96	12:11	4:3	30
	128 × 96	16:11	16:9	30

^a Pixel aspect ratio is informative and it indicates a typical aspect ratio for each resolution.

^b Display aspect ratio of which a video stream is rendered is informative, and it indicates a display aspect ratio with a resolution and the typical aspect ratio for the resolution.

Pixel aspect ratio:

- 1:1;
- 12:11;
- 10:11;
- 16:11;
- 40:33;
- 44:33;
- 64:33;
- 160:99;
- 18:11;
- 15:11;
- 24:11;
- 60:33;
- 20:11;
- 32:11;
- 80:33.

A bitstream conformant with these Media Format Profiles may use any of these pixel aspect ratios regardless of resolutions.

The Rendering Endpoint may ignore the pixel aspect ratio for rendering. Rendering Endpoint can shrink, stretch and crop image to the display aspect ratio dependent on vendor implementations.

The resolution shall not change in a video stream.

The frame rate is less than or equal to 30 fps.

Both fixed frame rate and variable frame rate are allowed.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	9XTPA	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.22.2

[GUIDELINE] A bitstream conformant to these profiles shall meet the following requirements.

Constraint Set1 Flag

- Shall be set to '1'.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	3XRI7	
---	---	-----	-----	-----	--------------------------	-------	--

[COMMENT] The constraint_set1 flag is used to signal that even though the content conforms to the Baseline profile, it will also be decodable by a Main profile decoder. When this flag is set to 1, do not use encoding features that are allowed in the Baseline profile but not the Main profile.

9.3.23 MPEG-4 Part 10 AV format: audio portion profile: MP4_BL_CIF15_AAC_520

9.3.23.1

[PROFILES]

AVC_MP4_BL_CIF15_AAC_520

9.3.23.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC audio format as specified in 8.9.2, except as indicated below.

Maximum audio bitrate (normative):

- 128 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	AHO3X	
---	---	-----	-----	-----	-----	-------	--

9.3.24 MPEG-4 Part 10 AV format: system portion profile: MP4_MP_SD

9.3.24.1

[PROFILE]

AVC_MP4_MP_SD

9.3.24.2

[GUIDELINE] A content binary conformant with this profile shall conform to all aspects of the MP4 file format as specified in ISO/IEC 14496-12:2012, ISO/IEC 14496-14:2003 and ISO/IEC 14496-15:2010. The following additional constraints also apply:

Maximum System bitrate:

- 11 Mbit/s.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2012 ISO/IEC 14496-14:2003 ISO/IEC 14496-15:2010	ITY26	
---	---	-----	-----	-----	---	-------	--

9.3.24.3

[GUIDELINE] A content binary shall either contain a single Media Data Box ('mdat') containing all audio and video data referenced by the movie box ('moov') (non-fragmented), or shall contain multiple 'mdat' boxes, with each 'mdat' box preceded by the movie ('moov') box or a movie fragment ('moof') box (fragmented).

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	C9GZF	C
---	---	-----	-----	-----	-----	-------	---

[COMMENT] The MP4 file format allows for a wide variety of media data and metadata layouts. This guideline restricts the layout to a limited number of forms.

Note that calculating the total duration and/or or determining the random access points in a fragmented movie requires the retrieval of the moov box and all moof boxes. Efficient retrieval of fragment metadata can be accomplished by using byte-based seek to read past mdat boxes in the content binary and by using the mfra (Movie Fragment Random Access) box, when present.

9.3.24.4

[GUIDELINE] One default video track shall be present in the content binary.

The default video track shall contain a Video Elementary Stream that conforms to 9.3.25.

The default video track shall have the lowest track ID among the video tracks contained in the content object.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	TYW3I	
---	---	-----	-----	-----	-----	-------	--

9.3.24.5

[GUIDELINE] The content binary may contain zero or more audio tracks.

[ATTRIBUTES]

O	L	n/a	n/a	n/a	n/a	7E3JL	
---	---	-----	-----	-----	-----	-------	--

9.3.24.6

[GUIDELINE] If the content binary contains at least one audio track, the first audio track shall have the lowest track ID among the audio tracks contained in the content binary and shall contain an Audio Elementary Stream that conforms to 9.3.26.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	MBURR	
---	---	-----	-----	-----	-----	-------	--

9.3.24.7

[GUIDELINE] For the default video track and the default audio track, "track_enabled" shall be set to the value of 1 in the "flags" field of Track Header Box ('tkhd') of the track.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	QAEOS	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] See 5.3 of ISO/IEC 14496-12:2012. "The track header flags track_in_movie and track_in_preview are not used in MP4 and shall be set to the default value of 1 in all files".

9.3.24.8

[GUIDELINE] Tracks other than the default video and audio tracks may be present in the content binary. Note that additional tracks may or may not be compliant to the Elementary Streams for the Media Format Profile.

[ATTRIBUTES]

O	C	n/a	n/a	n/a	n/a	KPXF8	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] Additional tracks may be BIFS track, optional audio tracks, optional video tracks, text/subtitle tracks or hint tracks.

9.3.24.9

[GUIDELINE] For fragmented content binaries, the 'moov' box shall be positioned after the 'ftyp' box and before the first 'mdat' box. Each 'moov' box shall be positioned before the corresponding 'mdat' box.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	EANEE	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] For streaming, moov is retrieved at first in consideration of streaming playback.

9.3.24.10

[GUIDELINE] Video and audio data should be interleaved in the 'mdat' box.

[ATTRIBUTES]

S	L	n/a	n/a	n/a	n/a	AGWOJ	
---	---	-----	-----	-----	-----	-------	--

9.3.24.11

[GUIDELINE] When more than one track is present in the content binary, the duration of a contiguous series of video track samples within a single 'mdat' box or across multiple 'mdat' boxes shall not exceed 1,001 s, and the duration of a contiguous series of audio track samples within a single 'mdat' box or across multiple 'mdat' boxes shall not exceed 1,003 s. Within a track, samples shall be in decoding time order within a media data ('mdat') box.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	43553	C
---	---	-----	-----	-----	-----	-------	---

COMMENT] A resource-constrained system may be unable to buffer a large number of non-interleaved samples. A duration of 1,001 s is needed to accommodate 30 frames of 29,97 fps video. A duration of 1,003 s is needed to accommodate 47 frames of AAC audio data.

9.3.24.12

[GUIDELINE] For fragmented content binaries, the first video sample of each 'mdat' box shall be a Non-IDR I frame or IDR frame.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	3328Z	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] Video samples are placed in decoding order in the content binary in accordance with ISO/IEC 14496-12:2012.

9.3.24.13

[GUIDELINE] For fragmented content binaries, the audio sample with the presentation time that is closest to the video sample containing the Non-IDR I frame or IDR frame should be stored as the first audio sample of each 'mdat'.

[ATTRIBUTES]

S	A	n/a	n/a	n/a	n/a	WDX9A	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This ensures that the first video sample and first audio sample of each movie fragment have approximately equal presentation times.

9.3.24.14

[GUIDELINE] For fragmented content binaries, to enable gradual decoder refresh, the sample containing the Non-IDR I frame or IDR frame and the corresponding recovery point should be stored in the same movie fragment.

[ATTRIBUTES]

S	R	n/a	n/a	n/a	n/a	VZNOW	
---	---	-----	-----	-----	-----	-------	--

9.3.24.15

[GUIDELINE] For fragmented content binaries, the total size of all Track Boxes ('trak') in the Movie Box ('moov') shall not exceed 32 kB.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	GCFV3	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This restriction reduces the time needed to buffer 'moov' box data, allowing playback of the content to begin more quickly.

9.3.24.16

[GUIDELINE] For fragmented content binaries, the size of the Movie Fragment Box ('moof'), including all boxes contained within the movie fragment box, shall not exceed 32 kB, and the duration of a movie fragment shall not exceed 10 s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	HOUWF	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] A resource-constrained system may be unable to process large fragments.

9.3.24.17

[GUIDELINE] The Sample Size Box ('stsz') shall be used. The Compact Sample Size Box ('stz2') shall not be used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	GH948	
---	---	-----	-----	-----	-----	-------	--

9.3.24.18

[GUIDELINE] For fragmented content binaries, only the 'mdat' box is allowed to have a size equal to 1. Only the last 'mdat' box in the file is allowed to have a size equal to 0. Other boxes shall not have a size equal to 1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	6TJBH	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] Subclause 4.2 of ISO/IEC 14496-12:2012 implies this requirement as follows; "size is an integer that specifies the number of bytes in this box, including all its fields and contained boxes; if size is 1 then the actual size is in the field largesize; if size is 0, then this box is the last one in the file, and its contents extend to the end of the file (normally only used for a Media Data Box).

9.3.24.19

[GUIDELINE] When a group of multiple tracks that contain alternate data for one another exists as part of a content binary, the value of the alternate_group field for each of these tracks should be the same non-zero value. When multiple instances of such groups exist, each group should have a distinct alternate_group value.

[ATTRIBUTES]

S	R	n/a	n/a	n/a	n/a	7WWXA	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] For example, this indicates that the multiple audio or video tracks are alternatives to each other (and should not be mixed).

9.3.24.20

[GUIDELINE] If a Serving Endpoint advertises content that is stored on the Serving Endpoint and conforms to this profile, the Serving Endpoint shall support byte-based seeking, as defined in Table 42 of IEC 62481-1-1:2017, and shall advertise such content as supporting byte-based seek operations.

This guideline does not apply to resources obtained from live content, or resources that have been created as the output of a real-time transcoding process.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	IEC 62481-1-1: 2017	CQT67	
---	---	-----	-------	-----	------------------------	-------	--

[COMMENT] This requirement enables a Rendering Endpoint to stream an MP4 file that does not have the 'moov' box positioned at the start of the file. Byte-based seek can be used to locate the 'moov' box at any position within the file so that streaming and decoding of the file can begin.

9.3.24.21

[GUIDELINE] A Serving Endpoint that responds to a time-seek request shall return a content binary that complies with this Media Format Profile. In addition, the returned content binary shall:

- start with an 'ftyp' box;
- contain a 'moov' box positioned after the 'ftyp' box and before the first 'mdat' box;
- have the first video sample be a Non-IDR I frame or IDR frame whose presentation time in the original content binary is (a) at or (b) nearest before or nearest after (as appropriate for positive or negative playback respectively) to the time specified by the time-seek request, in accordance with IEC 62481-1-1:2017 GUNs 57UJY and ES2RR;
- have the first audio sample(s) (if any) with a presentation time as close as possible to the first video sample.

[ATTRIBUTES]

M	L	DMS	M-DMS	n/a	IEC 62481-1-1: 2017	Z6TTG	
---	---	-----	-------	-----	------------------------	-------	--

[COMMENT] This requirement applies to both fragmented and non-fragmented content binaries. Note that for fragmented content binaries, an 'mdat' box may not follow the 'moov' box because the actual samples are stored in fragments. The contents of the 'moov' box and/or 'moof' box will often need to be specially constructed to conform to this requirement.

9.3.24.22

[GUIDELINE] The Serving Endpoint should ensure the 'moov' box sent in response to a time-seek request for content that conforms to this profile is less than 1 MiB through fragmentation and/or removal of unnecessary metadata.

[ATTRIBUTES]

S	R	DMS	M-DMS	n/a	n/a	SYL86	
---	---	-----	-------	-----	-----	-------	--

[COMMENT]

- Transferring a big 'moov' box can cause an initial delay in obtaining the initial media samples necessary to start rendering the AV stream.
- 'moof' boxes can be employed to split metadata across fragments when necessary, reducing the size of the 'moov' box.
- A Serving Endpoint can remove cover art and other metadata from the 'moov' box that is not useful in a time-seek response. Typically, keeping just 'trak' boxes in the 'moov' box is sufficient for playing the returned content binary.

9.3.24.23

[GUIDELINE] The content binary returned by a Serving Endpoint in response to a time-seek request shall include an Edit List ('elst') box that describes the start time of the content binary.

[ATTRIBUTES]

M	A	DMS	M-DMS	n/a	n/a	WX557	
---	---	-----	-------	-----	-----	-------	--

[COMMENT] A Rendering Endpoint uses the 'elst' box to determine the start time of the received portion of the complete content binary.

9.3.24.24

[GUIDELINE] The Rendering Endpoint shall be able to render content binaries where the 'moov' box does not immediately follow the 'ftyp' box in the content.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	ENSNFN	
---	---	---------	-------	-----	-----	--------	--

9.3.24.25

[GUIDELINE] The Rendering Endpoint shall be able to render at least the default video track and the default audio track.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	n/a	KD2WI	
---	---	---------	-------	-----	-----	-------	--

9.3.24.26

[GUIDELINE] The Rendering Endpoint shall be tolerant of additional tracks other than the default video and audio tracks.

[ATTRIBUTES]

M	R	DMP DMR	M-DMP	n/a	n/a	GJC8M	
---	---	---------	-------	-----	-----	-------	--

[COMMENT] In addition to the default video track and the default audio track, the Rendering Endpoint may support the rendering of additional tracks as defined in 9.3.24.8. The rendering of additional tracks is vendor-dependent.

9.3.25 MPEG-4 Part 10 AV format: video portion profile: MP4_MP_SD

9.3.25.1

[PROFILE]

AVC_MP4_MP_SD

9.3.25.2

[GUIDELINE] The main characteristics of video shall be conformant to ISO/IEC 14496-10:2010.

The main characteristics of AVC_MP4_MP_SD video streams are:

Profiles and level:

- Constrained Baseline Profile @ up to Level 3;
- Main Profile @ up to Level 3.

Chroma:

- 4:2:0.

Video bitrate:

- CBR or VBR: Maximum bitrate of 10 Mbit/s.

Table 64 – MPEG-4 Part 10 AV format Resolutions

Resolution	Allowed Field (interlaced) or Frame (progressive) Rates	Pixel Aspect Ratio	Display Aspect Ratio
720 × 576	23,976p, 24p, 25p, 50i, 50p	12:11	4:3
		16:11	16:9
720 × 480	23,976p, 24p, 29.97p, 30p, 59,94i, 60i, 59,94p, 60p	10:11	4:3
		40:33	16:9
704 × 480	23,976p, 24p, 29,97p, 30p, 59,94i, 60i, 59,94p, 60p	10:11	4:3
		40:33	16:9
640 × 480	23,976p, 24p, 25p, 29,97p, 30p, 50i, 59,94i, 60i, 50p, 59,94p, 60p	1:1	4:3
640 × 360	23,976p, 24p, 25p, 29,97p, 30p, 50i, 59,94i, 60i, 50p, 59,94p, 60p	1:1	16:9

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2010	A5IN6	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.25.3

[GUIDELINE] For fragmented content binaries, video frames contained within each 'mdat' box, except those that precede the first non-IDR I or IDR frame in display order, shall not refer to video frames contained within other 'mdat' boxes.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	8MTFD	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This requirement ensures that all video frames following the first non-IDR I or IDR frame in display order within a 'mdat' box can be correctly decoded and displayed in cases where a movie fragment is randomly accessed. Note that a non-IDR I frame that is preceded by video frames that refer to video frames stored within other 'mdat' boxes corresponds to a Type 3 Stream Access Point, as defined in ISO/IEC 14496-12:2012.

9.3.25.4

[GUIDELINE] A Serving Endpoint may output resolutions (lower than 720 x 576/480) other than those shown in Table 64.

[ATTRIBUTES]

O	A	DMS	M-DMS	n/a	n/a	52NNN	
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9.3.25.5

[GUIDELINE] If a Rendering Endpoint is not capable of rendering certain resolutions in full-screen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	4OE5E	
---	---	---------	-------	-----	-----	-------	--

9.3.26 MPEG-4 Part 10 AV format: audio portion profile: MP4_MP_SD**9.3.26.1****[PROFILE]****AVC_MP4_MP_SD****9.3.26.2**

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC_ISO_320 profile as specified in this standard except as noted here:

Sampling rate:

- 32 kHz;
- 44,1 kHz;

- 48 kHz.

Content audio channel modes:

- Mono (1/0);
- Stereo (2/0);
- Dual Monaural (1/0 + 1/0) as specified in IEC/TS 62592.

Maximum Audio bitrates:

- CBR or VBR: Up to 320 kbit/s.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	IEC/TS 62592	ZPZPD	
---	---	-----	-----	-----	--------------	-------	--

9.3.27 MPEG-4 Part 10 AV format: system portion profile: MP4_HP_HD

9.3.27.1

[PROFILE]

AVC_MP4_HP_HD

9.3.27.2

[GUIDELINE] A bitstream conformant with these profiles shall conform to all aspects of the system portion of the AVC_MP4_MP_SD profile as specified in 9.3.24, except as indicated below:

Maximum System bitrate:

- 30 Mbit/s.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	n/a	ODLCT	C
---	---	-----	-----	-----	-----	-------	---

9.3.27.3

[GUIDELINE] One default video track shall be present in the content binary.

The default video track shall contain a Video Elementary Stream that conforms to 9.3.28.

The default video track shall have the lowest track ID among the video tracks contained in the content object.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	Q955R	
---	---	-----	-----	-----	-----	-------	--

9.3.27.4

[GUIDELINE] The content binary may contain zero or more audio tracks.

[ATTRIBUTES]

O	L	n/a	n/a	n/a	n/a	DZCHD	
---	---	-----	-----	-----	-----	-------	--

9.3.28 MPEG-4 Part 10 AV format: video portion profile: MP4_HP_HD**9.3.28.1****[PROFILE]****AVC_MP4_HP_HD****AVC_MP4_HP_HD_MLP****9.3.28.2****[GUIDELINE]** The main characteristics of video shall be conformant to ISO/IEC 14496-10:2010.

Main characteristics of AVC_MP4_HP_HD video streams are:

Profiles and level:

- Constrained Baseline Profile @ up to Level 4;
- Main Profile @ up to Level 4;
- High Profile @ up to Level 4.

Chroma:

- 4:2:0.

Video bitrate:

- Constrained Baseline Profile: CBR or VBR: Maximum bitrate of 20 Mbit/s;
- Main Profile: CBR or VBR: Maximum bitrate of 20 Mbit/s;
- High Profile: CBR or VBR: Maximum bitrate of 25 Mbit/s.

Table 65 – MPEG-4 Part 10 AV format Resolutions

Resolution	Allowed Field (interlaced) or Frame (progressive) Rates	Pixel Aspect Ratio	Display Aspect Ratio
1 920 x 1 080	23,976p, 24p, 25p, 29,97p, 30p, 50i, 59,94i, 60i	1:1	16:9
1 440 x 1 080	23,976p, 24p, 25p, 29,97p, 30p, 50i, 59,94i, 60i	1:1	4:3
		4:3	16:9
1 280 x 720	23,976p, 24p, 25p, 29,97p, 30p, 50p, 59,94p, 60p	1:1	16:9
720 x 576	23,976p, 24p, 25p, 50i, 50p	12:11	4:3
		16:11	16:9
720 x 480	23,976p, 24p, 29,97p, 30p, 59,94i, 60i, 59,94p, 60p	10:11	4:3
		40:33	16:9
704 x 480	23,976p, 24p, 29,97p, 30p, 59,94i, 60i, 59,94p, 60p	10:11	4:3
		40:33	16:9
640 x 480	23,976p, 24p, 25p, 29,97p, 30p, 50i, 59,94i, 60i, 50p, 59,94p, 60p	1:1	4:3
640 x 360	23,976p, 24p, 25p, 29,97p, 30p, 50i, 59,94i, 60i, 50p, 59,94p, 60p	1:1	16:9

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2010	U8AY2	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.28.3

[GUIDELINE] For fragmented content binaries, video frames contained within each 'mdat' box, except those that precede the first non-IDR I or IDR frame in display order, shall not refer to video frames contained within other 'mdat' boxes.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	68CW8	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] This requirement ensures that all video frames following the first non-IDR I or IDR frame in display order within a 'mdat' box can be correctly decoded and displayed in cases where a movie fragment is randomly accessed. Note that a non-IDR I frame that is preceded by video frames that refer to video frames stored within other 'mdat' boxes corresponds to a Type 3 Stream Access Point, as defined in ISO/IEC 14496-12:2012.

9.3.28.4

[GUIDELINE] A Serving Endpoint may output resolutions (lower than 1 920 × 1 080) other than those shown in Table 65.

[ATTRIBUTES]

O	A	DMS	M-DMS	n/a	n/a	L3NWS	
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9.3.28.5

[GUIDELINE] If a Rendering Endpoint is not capable of rendering certain resolutions in fullscreen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	IYNSQ	
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9.3.29 MPEG-4 Part 10 AV format: audio portion profile: MP4_HP_HD

9.3.29.1

[PROFILE]

AVC_MP4_HP_HD

9.3.29.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the AAC_ISO_320 profile as specified in this standard except as noted here:

Sampling rate:

- 32 kHz;
- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- Mono (1/0);
- Stereo (2/0);

- Dual Monaural (1/0 + 1/0) as specified in IEC/TS 62592.

Maximum Audio bitrates:

- CBR or VBR: Up to 320 kbits/s.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	IEC/TS 62592	S5DH2	
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9.3.30 MPEG-4 Part 10 AV format: system portion profile: MP4_DTS

9.3.30.1

[PROFILES]

AVC_MP4_BL_DTS

VC_MP4_BL_DTSHD

AVC_MP4_MP_SD_DTS

AVC_MP4_MP_SD_DTSHD

AVC_MP4_HP_HD_DTS

AVC_MP4_HP_HD_DTSHD

9.3.30.2

[GUIDELINE] A bitstream conformant with these profiles shall conform to the provisions defined by ISO/IEC 14496-14:2003, ISO/IEC 14496-12:2004, ISO/IEC 14496-15:2004, and the additional constraints defined below.

Bitstream signalling:

- The presence of DTS or DTS-HD audio bitstreams in the file shall be signalled as defined in ETSI TS 102 114.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 ISO/IEC 14496-15:2004 ETSI TS 102 114	K7LUA	
---	---	-----	-----	-----	--	-------	--

9.3.31 MPEG-4 Part 10 AV format: video portion profile: MP4_BL_DTS

9.3.31.1

[PROFILES]

AVC_MP4_BL_DTS

AVC_MP4_BL_DTSHD

9.3.31.2

[GUIDELINE] The main characteristics of video stream shall be conformant to ISO/IEC 14496-10:2003.

The main characteristics of MPEG-4 Part 10 video streams of this profile are:

Profiles and level:

- Up to Baseline Profile at Level 2.

Resolution:

- Up to 416 × 240.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	LP5MA	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.32 MPEG-4 Part 10 AV format: video portion profile: MP4_MP_DTS

9.3.32.1

[PROFILES]

AVC_MP4_MP_SD_DTS

AVC_MP4_MP_SD_DTSHD

9.3.32.2

[GUIDELINE] The main characteristics of the video stream shall be conformant to ISO/IEC 14496-10:2003.

The main characteristics of MPEG-4 Part 10 video streams of this profile are:

Profiles and level:

- Up to Baseline Profile at Level 3.

Resolution:

- Up to 864 × 480 and/or 720 × 576.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	SZQY8	
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9.3.33 MPEG-4 Part 10 AV format: video portion profile: MP4_HP_DTS

9.3.33.1

[PROFILES]

AVC_MP4_HP_HD_DTS

AVC_MP4_HP_HD_DTSHD

9.3.33.2

[GUIDELINE] The main characteristics of the video stream shall be conformant to ISO/IEC 14496-10:2003.

The main characteristics of MPEG-4 Part 10 video streams of this profile are:

Profiles and level:

- Up to Baseline Profile at Level 4.

Resolution:

➤ Up to 1 920 × 1 080.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	ONKNA	
---	---	-----	-----	-----	--------------------------	-------	--

9.3.34 MPEG-4 Part 10 AV format: audio portion profile: MP4_DTS

9.3.34.1

[PROFILES]

AVC_MP4_BL_DTS

AVC_MP4_MP_SD_DTS

AVC_MP4_HP_HD_DTS

9.3.34.2

[GUIDELINE] A bitstream conformant with these profiles shall comply with ETSI TS 102 114, and may also contain DTS-HD audio data that complies with ETSI TS 102 114.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 114	76AJ2	
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9.3.34.3

[GUIDELINE] Rendering Endpoints that are conformant with these profiles may ignore any DTSHD audio data present in the bitstream.

[ATTRIBUTES]

O	A	DMP DMR	M-DMP	n/a	n/a	QUUM2	
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9.3.35 MPEG-4 Part 10 AV format: audio portion profile: MP4_DTSHD

9.3.35.1

[PROFILES]

AVC_MP4_BL_DTSHD

AVC_MP4_MP_SD_DTSHD

AVC_MP4_HP_HD_DTSHD

9.3.35.2

[GUIDELINE] A bitstream conformant with this profile shall comply with ETSI TS 102 114.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 114	F5SKR	
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9.3.36 MPEG-4 Part 10 AV format: system portion profile: MP4_MP_SD_EAC3

9.3.36.1

[PROFILES]

AVC_MP4_MP_SD_EAC3

9.3.36.2

[GUIDELINE] The main characteristics of this AVC_MP4_MP_SD_EAC3 stream are defined in ISO/IEC 14496-14:2003, ISO/IEC 14496-12:2004, ISO/IEC 14496-15:2004 and Annex F of ETSI TS 102 366:2014. The system portion profile shall also follow all requirements defined in 9.3.19.1, except for requirement 9.3.19.1.10.

The main characteristics of the AVC_MP4_MP_SD_EAC3 system stream are:

System bitrate:

- The maximum system bitrate, which is defined as the maximum of cumulative bitrate of streams of media data, shall not exceed 14 Mbit/s.

Number of video streams:

- One video stream only.

Number of audio streams:

- One audio stream encoded according to 9.3.38.2.
- Optionally, an audio stream encoded according to 9.3.38.3 may also be included.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 ISO/IEC 14496-15:2004 ETSI TS 102 366:2014	NU9TJ
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9.3.37 MPEG-4 Part 10 AV format: video portion profile: MP4_MP_SD_EAC3

9.3.37.1

[PROFILES]

AVC_MP4_MP_SD_EAC3

9.3.37.2

[GUIDELINE] The main characteristics of the video stream shall be conformant to ISO/IEC 14496-10:2003.

The main characteristics of MPEG-4 Part 10 video streams of this profile are:

Profiles and level:

- Main Profile at Level 3.0.

Chroma:

- 4:2:0.

Video bitrate:

- Maximum bitrate of 10 Mbit/s.

Table 66 shows the format resolutions for MPEG-4 Part 10.

Table 66 – MPEG-4 Part 10 AV format resolutions

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
864 × 480	16:9	25p, 23,976p
720 × 576	16:9, 4:3	50i, 25p
720 × 480	16:9, 4:3	59,94i, 29,97p, 23,976p
640 × 480	4:3	29,97p, 25p, 23,976p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	8PHMQ	
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9.3.37.3

[GUIDELINE] A Serving Endpoint may output resolutions (lower than 864 × 480) other than those shown in Table 66.

[ATTRIBUTES]

O	A	DMS	M-DMS	n/a	n/a	ND9P4	
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9.3.37.4

[GUIDELINE] If a Rendering Endpoint is not capable of rendering certain resolutions in fullscreen format, it shall be able to render them on part of the screen.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	9X842	
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9.3.38 MPEG-4 Part 10 AV format: audio portion profile: MP4_MP_SD_EAC3

9.3.38.1

[PROFILES]

AVC_MP4_MP_SD_EAC3

9.3.38.2

[GUIDELINE] The main characteristics of this AVC_MP4_MP_SD_EAC3 audio stream are defined in ETSI TS 102 366:2014.

Sampling rate:

- 44,1 kHz;

- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 3/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel).

Substream usage:

- All substreams shall be encoded at the same sample rate;
- All substreams shall be encoded with the same number of audio data blocks per syncframe.

Bitrate:

- CBR or VBR: 32 kbit/s to 3 024 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 366:2014	M541C	
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9.3.38.3

[GUIDELINE] An MPEG-4 HE-AAC v2 audio stream may be included in addition to the Enhanced AC-3 audio stream. If an MPEG-4 HE-AAC v2 audio stream is included, it shall meet the requirements specified in 8.9.36.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	22KZG	
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9.3.39 MPEG-4 Part 10 AV format: system portion profile: MP4_HP_HD_EAC3

9.3.39.1

[PROFILES]

AVC_MP4_HP_HD_EAC3

9.3.39.2

[GUIDELINE] The main characteristics of this AVC_MP4_HP_HD_EAC3 stream are defined in ISO/IEC 14496-14:2003, ISO/IEC 14496-12:2004, ISO/IEC 14496-15:2004 and Annex F of ETSI TS 102 366:2014. The system portion profile shall also follow all requirements defined in 9.3.38.2, except for requirement 9.3.19.1.10.

The main characteristics of the AVC_MP4_HP_HD_EAC3 system stream are:

System bitrate:

- The maximum system bitrate, which is defined as the maximum of cumulative bitrate of streams of media data, shall not exceed 29 Mbit/s.

Number of video streams:

- One video stream only.

Number of audio streams:

- One audio stream encoded according to 9.3.41.2.
- Optionally, an audio stream encoded according to 9.3.41.3 may also be included.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-14:2003 ISO/IEC 14496-12:2004 ISO/IEC 14496-15:2004 ETSI TS 102 366:2014	SO3FH
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9.3.40 MPEG-4 Part 10 AV format: video portion profile: MP4_HP_HD_EAC3

9.3.40.1

[PROFILES]

AVC_MP4_HP_HD_EAC3

9.3.40.2

[GUIDELINE] The main characteristics of the video stream shall be conformant to ISO/IEC 14496-10:2003.

The main characteristics of MPEG-4 Part 10 video streams of this profile are:

Profiles and level:

- Main Profile at Level 4.0.

Chroma:

- 4:2:0.

Video bitrate:

- Maximum bitrate of 25 Mbit/s.

Table 67 shows the format resolutions for MPEG-4 Part 10.

Table 67 – MPEG-4 Part 10 AV format resolutions

Resolution	Aspect ratio	Allowed Field (interlaced) or Frame (progressive) Rates
1 920 × 1 080	16:9	59,94i, 50i, 29,97p, 25p, 23,976p
1 440 × 1 080	16:9	59,94i, 50i, 29,97p, 25p, 23,976p
1 280 × 1 080	16:9	59,94i, 50i, 29,97p, 25p, 23,976p
1 280 × 720	16:9	59,94p, 50p, 23,976p
960 × 720	16:9	59,94p, 50p, 23,976p

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2003	5YLJW	
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9.3.40.3

[GUIDELINE] A Serving Endpoint may output resolutions (lower than 1 920 × 1 080) other than those shown in Table 67.

[ATTRIBUTES]

O	A	DMS	M-DMS	n/a	n/a	BYQPH	
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9.3.40.4

[GUIDELINE] If a Rendering Endpoint is not capable of rendering certain resolutions in fullscreen format. It shall be able to render them on part of the screen.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	n/a	3QUTN	
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9.3.41 MPEG-4 Part 10 AV format: audio portion profile: MP4_HP_HD_EAC3

9.3.41.1

[PROFILES]

AVC_MP4_HP_HD_EAC3

9.3.41.2

[GUIDELINE] The main characteristics of this AVC_MP4_HP_HD_EAC3 audio stream are defined in ETSI TS 102 366:2014.

Sampling rate:

- 44,1 kHz;
- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo);
- 3/0 (Multichannel);
- 2/1 (Multichannel);
- 3/1 (Multichannel);
- 2/2 (Multichannel);
- 3/2 (Multichannel);
- 6.1 (Multichannel);
- 7.1 (Multichannel).

The channel modes listed above may include an LFE channel.

Substream usage:

- All substreams shall be encoded at the same sample rate;

- All substreams shall be encoded with the same number of audio data blocks per syncframe.

Bitrate:

- CBR or VBR: 32 kbit/s to 3 024 kbit/s.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ETSI TS 102 366:2014	SKAXD	
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9.3.41.3

[GUIDELINE] An MPEG-4 HE-AAC v2 audio stream may be included in addition to the Enhanced AC-3 audio stream. If an MPEG-4 HE-AAC v2 audio stream is included, it shall meet the requirements specified in 8.9.36.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	OBOHN	
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9.3.42 MPEG-4 Part 10 AV format: system portion profile: MP4_HP_HD_MLP

9.3.42.1

[PROFILE]

AVC_MP4_HP_HD_MLP

9.3.42.2

[GUIDELINE] The main characteristics of this AVC_MP4_HP_HD_MLP stream are defined in ISO/IEC 14496-12:2012, ISO/IEC 14496-14:2003, ISO/IEC 14496-15:2010 and Dolby® TrueHD Bitstreams. The system portion profile shall also follow all requirements defined in 9.3.27, and the requirements below.

Main characteristics of the AVC_MP4_HP_HD_MLP system stream are:

System bitrate:

- The maximum system bitrate, which is defined as the maximum of cumulative bitrate of streams of media data, shall not exceed 40 Mbit/s.

Number of video streams:

- One video stream only according to clause 9.3.28.

Number of audio streams:

- One audio stream encoded according to clause 9.3.43.2;
- Optionally, an audio stream encoded according to clause 9.3.43.3 may also be included.

[ATTRIBUTES]

M	A	n/a	n/a	n/a	ISO/IEC 14496-12:2012 ISO/IEC 14496-14:2003 ISO/IEC 14496-15:2010 Dolby® TrueHD Bitstreams	RR3WO
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9.3.43 MPEG-4 Part 10 AV format: audio portion profile: MP4_HP_HD_MLP

9.3.43.1

[PROFILE]

AVC_MP4_HP_HD_MLP

9.3.43.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the MLP audio format profile as specified in 8.6.1, except as noted here:

Sampling Rate;

- 44,1 kHz;
- 48 kHz;
- 88,2 kHz;
- 96 kHz.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	n/a	DGB65
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9.3.43.3

[GUIDELINE] An MPEG-4 HE AAC v2 audio stream may be included in addition to the MLP audio stream. If an MPEG-4 HE AAC v2 audio stream is included, it shall meet the requirements specified in 8.9.36.

[ATTRIBUTES]

O	R	n/a	n/a	n/a	n/a	CSY87
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9.3.44 MPEG-4 Part 10 AV format: system portion profile: MP4_HD_HEAACV2_L6

9.3.44.1

[PROFILES]

AVC_MP4_HD_HEAACV2_L6

9.3.44.2

[GUIDELINE] A bitstream conformant with this profile shall conform to the provisions defined by ISO/IEC 14496-14:2003 and ISO/IEC 14496-15:2004, and the additional constraints defined in Guideline 9.3.19.1.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	E35FA	N
---	---	-----	-----	-----	-----	-------	---

9.3.45 MPEG-4 Part 10 AV format: video portion profile: MP4_HD_HEAACV2_L6

9.3.45.1

[PROFILES]

AVC_MP4_HD_HEAACV2_L6

9.3.45.2

[GUIDELINE] Main characteristics of video shall be conformant to ISO/IEC 14496-10:2003.

The main characteristics of MPEG-4 Part 10 video streams are:

Profiles and level:

➤ HP at the following levels:

L1;

L1.1;

L1.2;

L1.3;

L2;

L2.1;

L2.2;

L3;

L3.1;

L3.2;

L4.

Chroma:

➤ 4:2:0.

Video bitrate:

➤ High Profile;

Constant bitrate equal to or less than 20 Mbit/s;

Variable-maximum bitrate equal to or less than 20 Mbit/s.

Resolution:

➤ Any luminance resolution allowed by the applied H.264/AVC Profile and level may be used.

Any sample and picture aspect ratio allowed by the applied H.264/AVC Profile and level may be used.

A bitstream conformant with these Media Format Profiles may use any of these pixel aspect ratios regardless of resolutions.

The Rendering Endpoint may ignore the pixel aspect ratio for rendering. Rendering Endpoint can shrink, stretch and crop image to the display aspect ratio dependent on vendor implementations.

Resolution may change in a video stream.

Frame rate shall be any of these:

- 23,976 (progressive);
- 24 (progressive);
- 25 (interlaced or progressive);
- 29,97 (interlaced or progressive);
- 30 (interlaced or progressive);
- 50 (progressive);
- 59,94 (progressive);
- 60 (progressive).

The frame rate may change in a video stream.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-10:2010	FT879	C
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9.3.45.3

[GUIDELINE] A bitstream conformant with this profile shall meet the following requirement.

Maximum system bitrate:

- 25 Mbit/s (video up to 20 Mbit/s).

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	ULN7I	
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9.3.46 MPEG-4 Part 10 AV format: audio portion profile: MP4_HD_HEAACV2_L6

9.3.46.1

[PROFILES]

AVC_MP4_HD_HEAACV2_L6

9.3.46.2

[GUIDELINE] A bitstream conformant with this profile shall conform to all aspects of the HEAACv2_L6_ISO profile as specified in 8.9.44.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	MNV4I	N
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9.3.47 Summary of MPEG-4 Part 10 AV format profiles with CFF encapsulation

Table 68 is a summary of MPEG-4 Part 10 profiles for the AV Media Class with CFF encapsulation.

Table 68 – Summary MPEG-4 Part 10 (AVC) profiles for the AV Media Class with CFF encapsulation

DLNA Profile ID	System portion profiling	Video portion profiling		Audio portion profiling						
	CFF	HP_L4	CBP_L3	AAC	AAC_MULT5	AC3	DTS	DTSHD	EAC3	MLP
AVC_CFF_SD	X		X	X	X	X	X	X	X	
AVC_CFF_HD	X	X		X	X	X	X	X	X	X

9.3.48 MPEG-4 Part 10 AV format: system portion profile: CFF_SD**9.3.48.1****[PROFILE]****AVC_CFF_SD****9.3.48.2**

[GUIDELINE] A content binary conformant to the AVC_CFF_SD profile shall conform to the requirements defined in ISO/IEC 14496-12:2012, ISO/IEC 14496-14:2003, ISO/IEC 14496-15:2010, ETSI TS 102 114, ETSI TS 102 366:2014 and specifically Annex B of DECE CFF/MF:2012.

Main characteristics of the AVC_CFF_SD system stream are:

Number of video streams:

- One video stream encoded according to 9.3.49.2.

Number of audio streams:

- One audio stream encoded according to 9.3.50.2;
- Up to 31 additional audio streams encoded according to 9.3.50.3.

Number of subtitle streams:

- Zero to 255 subtitle streams encoded according to 9.3.51.2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2012 ISO/IEC 14496-14:2003 ISO/IEC 14496-15:2010 ETSI TS 102 114 ETSI TS 102 366:2014 DECE CFF/MF:2012	GF8KU
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[COMMENT] The AVC_CFF_SD profile does not include a limitation on the total system bitrate of all streams in the CFF file, as CFF enables a Rendering Endpoint to select only the tracks that it needs to decode, limiting the effective maximum system bitrate to the sum of the data rate of all selected tracks.

9.3.48.3

[GUIDELINE] The video stream and/or one or more audio streams may be encrypted.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	n/a	7FC5S	
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9.3.48.4

[GUIDELINE] If the video stream or any audio stream within the content binary is encrypted, the stream shall be encrypted according to all applicable parts of DECE CFF/MF:2012, specifically Section 3, and section B.3 of Annex B.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	DECE CFF/MF: 2012	UWA35	
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9.3.49 MPEG-4 Part 10 AV format: video portion profile: CFF_SD

9.3.49.1

[PROFILE]

AVC_CFF_SD

9.3.49.2

[GUIDELINE] Main characteristics of the video shall be conformant to ISO/IEC 14496-10:2010 and shall conform to all mandatory extensions and constraints defined in DECE CFF/MF:2012, specifically Annex B.

The main characteristics of MPEG-4 Part 10 video streams are:

Profiles and level:

- Constrained Baseline Profile @ Level 3.0.

Chroma:

- 4:2:0.

Video bitrate:

- Up to a maximum bitrate of 10 Mbit/s.

Table 69 – MPEG-4 Part 10 AV format Resolutions

Display Resolution	Display Aspect Ratio	Maximum Encoded Resolution	Pixel Aspect Ratio	Allowed Frame Rates
854 × 480	16:9 (1,778)	854 × 480	1:1	25p, 23,976p
		704 × 576	16:11	25p
		704 × 480	40:33	29,97p, 23,976p
		640 × 480	4:3	29,97p, 25p, 23,976p
		640 × 360	1:1	50p, 29,97p, 25p, 23,976p
		426 × 360	3:2	59,94p, 50p, 29,97p, 25p, 23,976p
640 × 480	4:3 (1,333)	704 × 576	12:11	25p
		704 × 480	10:11	29,97p, 23,976p
		640 × 480	1:1	29,97p, 25p, 23,976p
		480 × 480	4:3	29,97p, 25p, 23,976p
		480 × 360	1:1	59,94p, 50p, 29,97p, 25p, 23,976p
		320 × 360	3:2	59,94p, 50p, 29,97p, 25p, 23,976p
416 × 240	16:9 (1,733)	416 × 240	1:1	29,97p, 25p, 23,976p
320 × 240	4:3 (1,333)	320 × 240	1:1	29,97p, 25p, 23,976p
320 × 180	16:9 (1,778)	320 × 180	1:1	29,97p, 25p, 23,976p

Table 69 shows the format resolutions for MPEG-4 Part 10.

Video sub-sampling and AVC constraints:

- Video sub-sampling shall be constrained to the value combinations in Tables B-1 and B-2 of Annex B of DECE CFF/MF:2012.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2010 DECE CFF/MF: 2012	3GUTT
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9.3.50 MPEG-4 Part 10 AV format: audio portion profile: CFF_SD

9.3.50.1

[PROFILE]

AVC_CFF_SD

9.3.50.2

[GUIDELINE] A content binary conformant with the AVC_CFF_SD profile shall contain an MPEG-4 AAC audio stream that conforms to ISO/IEC 14496-3:2009 and to all mandatory extensions and constraints in DECE CFF/MF:2012, specifically Annex B, including:

Profiles and level:

- AAC Profile @ Level 2.

Sampling rate:

- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo).

Bitrate:

- CBR or VBR: up to 192 kbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-3:2009 DECE CFF/MF: 2012	RLM4T
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9.3.50.3

[GUIDELINE] A content binary conformant with the AVC_CFF_SD profile may contain up to 31 additional audio streams. Any additional streams shall meet the requirements specified in DECE CFF/MF:2012, specifically Section 5 and Annex B. The audio coding formats that may be used to encode the additional streams are summarized in Table 70.

Table 70 – Permitted optional audio formats in AVC_CFF_SD content

Audio format	Max. no. channels	Max. bitrate	Sample rate	Reference
MPEG-4 AAC	2	192 kbit/s	48 kHz	ISO/IEC 14496-3:2009
MPEG-4 AAC [5.1-Channel]	5.1	960 kbit/s	48 kHz	ISO/IEC 14496-3:2009
AC-3 (Dolby Digital)	5.1	640 kbit/s	48 kHz	ETSI TS 102 366:2014
Enhanced AC-3 (Dolby Digital Plus)	5.1	3 024 kbit/s	48 kHz	ETSI TS 102 366:2014
DTS	5.1	1 536 kbit/s	48 kHz	ETSI TS 102 114
DTS-HD	5.1	3 018 kbit/s	48 kHz	ETSI TS 102 114

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ISO/IEC 14496-3:2009 ETSI TS 102 114 ETSI TS 102 366:2014	ZUXHA
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9.3.51 MPEG-4 Part 10 AV format: subtitle portion profile, CFF_SD

9.3.51.1

[PROFILE]

AVC_CFF_SD

9.3.51.2

[GUIDELINE] If a content binary conformant to this profile contains one or more subtitle streams, these streams shall conform to all mandatory extensions and constraints defined in DECE CFF/MF:2012, specifically Annex B.

[Attributes]

M	R	n/a	n/a	n/a	DECE CFF/MF: 2012	RQFBZ	
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9.3.51.3

[GUIDELINE] A Rendering Endpoint that supports this profile shall implement the selection and rendering requirements for subtitles as specified in 8.3.3 of DECE DS:2012.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	DECE DS:2012	9EUJD	
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9.3.52 MPEG-4 Part 10 AV format: MIME type definition, CFF_SD**9.3.52.1****[PROFILE]****AVC_CFF_SD****9.3.52.2**

[GUIDELINE] If one or more Elementary Streams within a content binary that conforms to the AVC_CFF_SD profile are encrypted according to 9.3.48.4, then the MIME type "video/vnd.dece.mp4 sdv1 1" shall be used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	GSTLW	
---	---	-----	-----	-----	-----	-------	--

9.3.52.3

[GUIDELINE] If all Elementary Streams within a content binary that conforms to the AVC_CFF_SD profile are unencrypted, then the MIME type "video/vnd.dece.mp4 sdv1 0" shall be used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	EPTHU	
---	---	-----	-----	-----	-----	-------	--

[COMMENT] When a content binary that conforms to this profile is transferred using Link Protection, the content binary itself is delivered with all Elementary Streams unencrypted, with decryption of the content binary being performed by the Serving Endpoint.

9.3.53 MPEG-4 Part 10 AV format: system portion profile: CFF_HD**9.3.53.1****[PROFILE]****AVC_CFF_HD**

9.3.53.2

[GUIDELINE] A content binary conformant to the AVC_CFF_HD profile shall conform to the requirements defined in ISO/IEC 14496-12:2012, ISO/IEC 14496-14:2003, ISO/IEC 14496-15:2010, ETSI TS 102 114, ETSI TS 102 366:2014, Dolby® TrueHD Bitstreams and specifically Annex C of DECE CFF/MF:2012.

The main characteristics of the AVC_CFF_HD system stream are:

Number of video streams:

- One video stream encoded according to 9.3.54.2.

Number of audio streams:

- One audio stream encoded according to 9.3.55.2;
- Up to 31 additional audio streams encoded according to 9.3.55.3.

Number of subtitle streams:

- Zero to 255 subtitle streams encoded according to 9.3.56.2.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-12:2012 ISO/IEC 14496-14:2003 ISO/IEC 14496-15:2010 ETSI TS 102 114 ETSI TS 102 366:2014 Dolby® TrueHD Bitstreams DECE CFF/MF: 2012	VBV47
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[COMMENT] The AVC_CFF_HD profile does not include a limitation on the total system bitrate of all streams in the CFF file, as CFF enables a Rendering Endpoint to select only the tracks that it needs to decode, limiting the effective maximum system bitrate to the sum of the data rate of all selected tracks.

9.3.53.3

[GUIDELINE] The video stream and/or one or more audio streams may be encrypted.

[ATTRIBUTES]

O	A	n/a	n/a	n/a	n/a	UXLJT
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9.3.53.4

[GUIDELINE] If the video stream or any audio stream within the content binary is encrypted, the stream shall be encrypted according to all applicable parts of DECE CFF/MF:2012, specifically Section 3, and Section C.3 of Annex C.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	DECE CFF/MF: 2012	7SZRU
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9.3.54 MPEG-4 Part 10 AV format: video portion profile: CFF_HD**9.3.54.1****[PROFILE]****AVC_CFF_HD****9.3.54.2**

[GUIDELINE] The main characteristics of the video shall be conformant to ISO/IEC 14496-10:2010 and shall conform to all mandatory extensions and constraints defined in DECE CFF/MF:2012, specifically Annex C:

The main characteristics of MPEG-4 Part 10 video streams are:

Profiles and level:

- High Profile @ Level 4.0.

Chroma:

- 4:2:0.

Video bitrate:

- Up to a maximum bitrate of 25 Mbit/s.

Table 71 – MPEG-4 Part 10 AV format Resolutions

Display resolution	Display aspect ratio	Maximum encoded resolution	Pixel aspect ratio	Allowed field (interlaced) or frame (progressive) rates
1 920 x 1 080	16:9 (1,778)	1 920 × 1 080	1:1	29,97p, 25p, 23,976p
		1 440 × 1 080	4:3	
		1 440 × 810	1:1	
		960 × 810	3:2	
1 280 x 720	16:9 (1,778)	1 280 × 720	1:1	59,94p, 50p, 29,97p, 25p, 23,976p
		960 × 720	4:3	
		640 × 720	2:1	
854 x 480	16:9 (1,778)	854 × 480	1:1	25p, 23,976p
		704 × 576	16:11	25p
		704 × 480	40:33	29,97p, 23,976p
		640 × 480	4:3	29,97p, 25p, 23,976p
		640 × 360	1:1	50p, 29,97p, 25p, 23,976p
		426 × 360	3:2	59,94p, 50p, 29,97p, 25p, 23,976p
640 x 480	4:3 (1,333)	704 × 576	12:11	25p
		704 × 480	10:11	29,97p, 23,976p
		640 × 480	1:1	29,97p, 25p, 23,976p
		480 × 480	4:3	29,97p, 25p, 23,976p
		480 × 360	1:1	59,94p, 50p, 29,97p, 25p, 23,976p
		320 × 360	3:2	59,94p, 50p, 29,97p, 25p, 23,976p
416 x 240	16:9 (1,733)	416 × 240	1:1	29,97p, 25p, 23,976p
320 x 240	4:3 (1,333)	320 × 240	1:1	29,97p, 25p, 23,976p
320 x 180	16:9 (1,778)	320 × 180	1:1	29,97p, 25p, 23,976p

Table 71 shows the format resolutions for MPEG-4 Part 10.

Video sub-sampling and AVC constraints:

- Video sub-sampling shall be constrained to the value combinations in Tables C-1 and C-2 of Annex C of DECE CFF/MF:2012.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	ISO/IEC 14496-10:2010 DECE CFF/MF: 2012	UGLFE
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9.3.55 MPEG-4 Part 10 AV format: audio portion profile: CFF_HD

9.3.55.1

[PROFILE]

AVC_CFF_HD

9.3.55.2

[GUIDELINE] A content binary conformant with the AVC_CFF_HD profile shall contain an MPEG-4 AAC audio stream that conforms to ISO/IEC 14496-3:2009 and to all mandatory extensions and constraints in DECE CFF/MF:2012, specifically Annex C, including:

Profiles and level:

- AAC Profile @ Level 2.

Sampling rate:

- 48 kHz.

Content audio channel modes:

- 1/0 (Mono);
- 2/0 (Stereo).

Bitrate:

- CBR or VBR: up to 192 kbit/s.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	ISO/IEC 14496-3:2009 DECE CFF/MF: 2012	T8XL4
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9.3.55.3

[GUIDELINE] A content binary conformant with the AVC_CFF_HD profile may contain up to 31 additional audio streams. Any additional streams shall meet the requirements specified in DECE CFF/MF:2012, specifically Section 5 and Annex C. The audio coding formats that may be used to encode the additional streams are summarized in Table 72.

Table 72 – Permitted optional audio formats in AVC_CFF_HD content

Audio format	Max. no. channels	Max. bitrate	Sample rate	Reference
MPEG-4 AAC	2	192 kbit/s	48 kHz	ISO/IEC 14496-3:2009
MPEG-4 AAC [5.1-Channel]	5.1	960 kbit/s	48 kHz	ISO/IEC 14496-3:2009
AC-3 (Dolby Digital)	5.1	640 kbit/s	48 kHz	ETSI TS 102 366:2014
Enhanced AC-3 (Dolby Digital Plus)	7.1	3 024 kbit/s	48 kHz	ETSI TS 102 366:2014
DTS	5.1	1 536 kbit/s	48 kHz or 96 kHz	ETSI TS 102 114
DTS	6.1	1 536 kbit/s	48 kHz	ETSI TS 102 114
DTS-HD	7.1	6 123 kbit/s	48 kHz or 96 kHz	ETSI TS 102 114
DTS-HD Master Audio	8	24 576 kbit/s	48 kHz or 96 kHz	ETSI TS 102 114
MLP (Dolby TrueHD)	8	18 000 kbit/s	48 kHz or 96 kHz	Dolby, Meridian Lossless Packing

[ATTRIBUTES]

O	R	n/a	n/a	n/a	ISO/IEC 14496-3:2009 ETSI TS 102 114 ETSI TS 102 366:2014 Dolby, Meridian Lossless Packing	IICK8
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9.3.56 MPEG-4 Part 10 AV format: subtitle portion profile, CFF_HD**9.3.56.1****[PROFILE]****AVC_CFF_HD****9.3.56.2**

[GUIDELINE] If a content binary conformant to this profile contains one or more subtitle streams, these streams shall conform to all mandatory extensions and constraints defined in DECE CFF/MF:2012, specifically Annex C.

[ATTRIBUTES]**9.3.56.3**

[GUIDELINE] A Rendering Endpoint that supports this profile shall implement the selection and rendering requirements for subtitles as specified in 8.3.3 of DECE DS:2012.

[ATTRIBUTES]

M	A	DMP DMR	M-DMP	n/a	DECE DS:2012	OFMEZ
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9.3.57 MPEG-4 Part 10 AV format: MIME type definition, CFF_HD

9.3.57.1

[PROFILE]

AVC_CFF_HD

9.3.57.2

[GUIDELINE] If one or more Elementary Streams within a content binary that conforms to the AVC_CFF_HD profile are encrypted according to 9.3.53.4, then the MIME type "video/vnd.dece.mp4 hdv1 1" shall be used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	DWKCB	
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9.3.57.3

[GUIDELINE] If all Elementary Streams within a content binary that conforms to the AVC_CFF_HD profile are unencrypted, then the MIME type "video/vnd.dece.mp4 hdv1 0" shall be used.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	6NEGY	
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[COMMENT] When a content binary that conforms to this profile is transferred using Link Protection, the content binary itself is delivered with all Elementary Streams unencrypted, with decryption of the content binary being performed by the Serving Endpoint.

9.3.58 Summary of MPEG-4 Part 10 AV format profiles with MKV encapsulation

Table 73 is a summary of MPEG-4 Part 10 profiles for the AV Media Class with MKV encapsulation.

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Table 73 – Summary of MPEG-4 Part 10 (AVC) profiles for the AV Media Class with MKV encapsulation

DLNA Profile ID	System portion profile	Video portion profile			Audio portion profile								
	MKV	MP_L3	MP_L4	HP_L4	AC3	DTS	DTS_E	DTS_L	EAC3	MLP	MPEG1_L3	AAC_MULT5	HEAAC_L4
AVC_MKV_MP_HD_AC3	X	X	X		X								
AVC_MKV_MP_HD_DTS	X	X	X			X							
AVC_MKV_MP_HD_DTSE	X	X	X				X						
AVC_MKV_MP_HD_DTSL	X	X	X					X					
AVC_MKV_MP_HD_EAC3	X	X	X						X				
AVC_MKV_MP_HD_MPEG1_L3	X	X	X								X		
AVC_MKV_MP_HD_AAC_MULT5	X	X	X									X	
AVC_MKV_MP_HD_HEAAC_L4	X	X	X										X
AVC_MKV_HP_HD_AC3	X	X	X	X	X								
AVC_MKV_HP_HD_DTS	X	X	X	X		X							
AVC_MKV_HP_HD_DTSE	X	X	X	X			X						
AVC_MKV_HP_HD_DTSL	X	X	X	X				X					
AVC_MKV_HP_HD_EAC3	X	X	X	X					X				
AVC_MKV_HP_HD_MLP	X	X	X	X						X			
AVC_MKV_HP_HD_MPEG1_L3	X	X	X	X							X		
AVC_MKV_HP_HD_AAC_MULT5	X	X	X	X								X	
AVC_MKV_HP_HD_HEAAC_L4	X	X	X	X									X

9.3.59 General format guidelines for Matroska (MKV) files

9.3.59.1 Matroska (MKV) file conformance

9.3.59.1.1

[PROFILES]

AVC_MKV_MP_HD_AC3

AVC_MKV_MP_HD_EAC3

AVC_MKV_MP_HD_DTS

AVC_MKV_MP_HD_DTSE

AVC_MKV_MP_HD_DTSL

AVC_MKV_MP_HD_MPEG1_L3

AVC_MKV_MP_HD_AAC_MULT5

AVC_MKV_MP_HD_HEAAC_L4

AVC_MKV_HP_HD_AC3

AVC_MKV_HP_HD_DTS
 AVC_MKV_HP_HD_DTSE
 AVC_MKV_HP_HD_EAC3
 AVC_MKV_HP_HD_MLP
 AVC_MKV_HP_HD_MPEG1_L3
 AVC_MKV_HP_HD_AAC_MULT5
 AVC_MKV_HP_HD_HEAAC_L4

9.3.59.1.2

[GUIDELINE] A bitstream conformant to these profiles shall conform to the provisions defined by the Matroska format.

[ATTRIBUTES]

M	L	n/a	n/a	n/a	Matroska	OLMYI	N
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9.3.59.2 MPEG-4 Part 10 AV format: MIME type definition, MKV

9.3.59.2.1

[PROFILES]

AVC_MKV_MP_HD_AC3
 AVC_MKV_MP_HD_DTS
 AVC_MKV_MP_HD_DTSE
 AVC_MKV_MP_HD_DTSL
 AVC_MKV_MP_HD_EAC3
 AVC_MKV_MP_HD_MPEG1_L3
 AVC_MKV_MP_HD_AAC_MULT5
 AVC_MKV_MP_HD_HEAAC_L4
 VC_MKV_HP_HD_AC3
 AVC_MKV_HP_HD_DTS
 AVC_MKV_HP_HD_DTSE
 AVC_MKV_HP_HD_DTSL
 AVC_MKV_HP_HD_EAC3
 AVC_MKV_HP_HD_MLP
 AVC_MKV_HP_HD_MPEG1_L3
 VC_MKV_HP_HD_AAC_MULT5
 AVC_MKV_HP_HD_HEAAC_L4

9.3.59.2.2

[GUIDELINE] MIME type "video/x-matroska" shall be used for these Media Format Profiles.

[ATTRIBUTES]

M	R	n/a	n/a	n/a	n/a	PO5Q8	
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