
**Information technology — Coding of
audio-visual objects —**

**Part 3:
Audio**

**AMENDMENT 3: MPEG-1/2 Audio in
MPEG-4**

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Technologies de l'information — Codage des objets audiovisuels —

ISO/IEC 14496-3:2001/Amd.3:2005

Partie 3: Codage audio

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AMENDEMENT 3: Audio MPEG-1/2 dans MPEG-4

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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Amendment 3 to ISO/IEC 14496-3:2001 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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Add the following subclauses:

1.5.1.2.26 Layer-1 Audio object type

The Layer-1 object is the counterpart of the audio coding scheme Layer-1 specified in ISO/IEC 11172-3 and ISO/IEC 13818-3.

1.5.1.2.27 Layer-2 Audio object type

The Layer-2 object is the counterpart of the audio coding scheme Layer-2 specified in ISO/IEC 11172-3 and ISO/IEC 13818-3.

1.5.1.2.28 Layer-3 Audio object type

The Layer-3 object is very similar to the audio coding scheme Layer-3 specified in ISO/IEC 11172-3 and ISO/IEC 13818-3. However, the use of Layer 3 encoded data as defined in ISO/IEC 13818-3 is limited to the "Lower Sampling Frequencies" case, i.e. the Layer 3 multi-channel syntax defined in ISO/IEC 13818-3 is not permitted in this scope. Furthermore, additional sampling rates have been specified.

In subclause 1.6.2.1 (AudioSpecificConfig), Table 1.8 (Syntax of AudioSpecificConfig), replace (as often as it appears):

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| **audioObjectType;** | **5** | **bslbf** |

with: <https://standards.iteh.ai/catalog/standards/sist/c2ee4133-16c3-4578-8f85-94e3f6655848/iso-iec-14496-3-2001-amd-3-2005>

| audioObjectType = GetAudioObjectType(); |

In subclause 1.6.2.1 (AudioSpecificConfig), Table 1.8 (Syntax of AudioSpecificConfig), replace (as often as it appears):

| **extensionAudioObjectType;** | **5** | **bslbf** |

with:

| extensionAudioObjectType = GetAudioObjectType(); |

In subclause 1.6.2.1 (*AudioSpecificConfig*), add below Table 1.8 (*Syntax of AudioSpecificConfig*):

Table 1.8a – Syntax of GetAudioObjectType()

Syntax	No. of bits	Mnemonic
GetAudioObjectType() { audioObjectType ; if (audioObjectType == 31) { audioObjectType = 32 + audioObjectTypeExt ; } return audioObjectType; }	5	uimsbf
	6	uimsbf

In subclause 1.6.2.1 (*AudioSpecificConfig*), Table 1.8 (*Syntax of AudioSpecificConfig*), add above of the data element *epConfig*:

```
if ( audioObjectType == 32 || audioObjectType == 33 ||
    audioObjectType == 34 )
    MPEG_1_2_SpecificConfig();
```

Add the following subclause:

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1.6.2.1.10 MPEG_1_2_SpecificConfig

Defined in ISO/IEC 14496-3 subpart 9.

In subclause 1.6.2.2.1 (*Overview*), add the following lines to Table 1.9:

Layer-1	32	ISO/IEC 14496-3 subpart 9	
Layer-2	33	ISO/IEC 14496-3 subpart 9	
Layer-3	34	ISO/IEC 14496-3 subpart 9	

Add after subclause 1.6.3.1 (*AudioObjectType*):

1.6.3.1a AudioObjectTypeExt

This data element extends the range of audio object types.

Create a new subpart, with the following content:

Subpart 9: MPEG-1/2 Audio in MPEG-4

9.1 Scope

The MPEG-1/2 Audio in MPEG-4 subpart of MPEG-4 Audio specifies the usage of MPEG-1/2 Layer-1, 2 or 3 in an MPEG-4 oriented way, i.e. such that signalling and access unit handling on Systems level is identical to the other MPEG-4 audio object types.

In order to be carried in MPEG-4, the MPEG-1/2 Layer 1, 2 or 3 bitstream frames are re-formatted such that they become self-contained MPEG-4 access units. This facilitates transport over packet based networks, random access, and editability. Those self-contained access units, as used in an MPEG-4 Systems compliant transport or storage format, can be re-converted to MPEG-1/2 compliant bitstreams, and then decoded with any MPEG-1/2 compliant decoder. Several methods of re-conversion are given in an informative annex.

The MPEG-4 Audio syntax is further extended to allow multi-channel configurations based on ISO/IEC 11172-3 and ISO/IEC 13818-3 Layer 3. The multi-channel configurations are similar to the configurations defined for the other multi-channel capable MPEG-4 audio object types. Note that for MPEG-1/2 Layer 1 and 2 the format is not extended. The multi-channel format for these layers is described in ISO/IEC 13818-3.

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Furthermore, the permitted sampling frequencies for Layer-3 are extended.

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Assistance is furthermore provided in the use of decSpecificInfo and accessUnit as to utilize MPEG-1/2 Layer 1, 2 or 3 in the MPEG-4 world by means of the legacy MPEG-4 Systems interface using ObjectTypeIndication 0x69 or 0x6b.

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9.2 MPEG_1_2_SpecificConfig

Table 9.1 – MPEG_1_2_SpecificConfig()

Syntax	No. of bits	Mnemonic
MPEG_1_2_SpecificConfig() { extension; }	1	bslbf

extension shall be zero.

9.3 Channel Mapping

The following rules apply:

- single_channel_element()'s and lfe_element()'s are represented by mono audio frames.
- channel_pair_element()'s are represented by stereo audio frames.
- For Layer-1 and Layer-2, not more than one mono audio frame representing a single_channel_element() or one stereo audio frame representing a channel_pair_element() is permitted.

9.4 Access Unit Format

9.4.1 Layer 1 and 2

One audio frame maps directly to one access unit.

9.4.2 Layer 3

One access unit consists of one or more mp3_channel_elements. An mp3_channel_element equals a Layer 3 audio frame with the following modifications compared to its definition in ISO/IEC 11172-3 or ISO/IEC 13818-3:

syncword (12 bit) signals the total length in bytes of the mp3_channel_element (consisting of header, error_check, side info and main data).

main_data_begin (9/8 bit) is either set to the correct value of the corresponding MPEG-1/2 Layer 3 bitstream or to zero.

main_data() is generally stored after the side information.

All other data elements shall be set according to their specification in ISO/IEC 11172-3 or ISO/IEC 13818-3. All settings in the header shall correspond to the settings in the AudioSpecificConfig().

All mp3_channel_elements belonging to the same timestamp are stored sequentially into one access unit according to the order given in subpart 1, subclause 1.6.3.4, Table 1.11 (Channel Configuration). An example of a 5.1 channel configuration is given in Figure 9.1.



H: Header, SI: SideInfo, MD: MainData

Figure 9.1 – Access Unit containing mp3_channel_elements for a 5.1 channel configuration

9.5 Sampling rate extension for Layer 3

This subsection provides specifications to allow the usage of Layer 3 with sampling rates not specified in ISO/IEC 11172-3 or ISO/IEC 13818-3.

The bitstream syntax and description for the extension towards sampling frequencies lower than those specified in ISO/IEC 13818-3 are in accordance of ISO/IEC 13818-3 (one frame covers 576 samples).

The subsequent subclauses outline the necessary extensions.

9.5.1 Bitrates

Table 9.1 specifies the bitrate depending on the bitrate_index and sampling frequency.

Table 9.1 – Bitrate depending on bitrate_index and sampling frequency

bitrate_index	bitrate specified (kbit/s)		
	8, 11.025, 12 kHz	16, 22.05, 24 kHz (see ISO/IEC 13818-3)	32, 44.1, 48 kHz (see ISO/IEC 1aa72-3)
'0000'	free	free	free
'0001'	8	8	32
'0010'	16	16	40
'0011'	24	24	48
'0100'	32	32	56
'0101'	40	40	64
'0110'	48	48	80
'0111'	56	56	96
'1000'	64	64	112
'1001'	forbidden	80	128
'1010'	forbidden	96	160
'1011'	forbidden	112	192
'1100'	forbidden	128	224
'1101'	forbidden	144	256
'1110'	forbidden	160	320
'1111'	forbidden	forbidden	forbidden

9.5.2 Sampling frequency

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Depending on the sampling frequency signaled in the AudioSpecificConfig, the data element sampling_frequency in the header has to be set as specified in Table 9.2.

Table 9.1 – Setting of the data element sampling_frequency depending on the sampling frequency specified in the AudioSpecificconfig()

sampling_frequency	sampling frequency
00	11.025 kHz and multiples thereof
01	12 kHz and multiples thereof
10	8 kHz and multiples thereof
11	reserved

9.5.3 Padding

Padding is necessary with a sampling frequency of 11.025 kHz and multiples thereof.

9.5.4 Scalefactor bands

The subdivision of the spectrum into scalefactor bands is fixed for every block length and sampling frequency and stored in tables in the coder and decoder. The tables for the sampling frequencies not specified in ISO/IEC 11172-3:1993 or ISO/IEC 13818-3:1998 are specified in Annex 9.A. In accordance with ISO/IEC 11172-3 or ISO/IEC 13818-3, the scale factor for frequency lines above the highest line in the tables is zero, which means that the actual multiplication factor is 1.0.

9.5.5 Intensity stereo mode

Step 3 of the intensity stereo mode decoding (see ISO/IEC 11172-3, subclause 2.4.3.4.9.3) is clarified as follows:

- if only the uppermost scalefactor band is in intensity stereo mode, then

is_ratio(20) = 1 for long blocks

is_ratio(11) = 1 for short blocks

- if at least the upper two scalefactor bands are in intensity stereo mode, then

is_ratio(20) = is_ratio(19) for long blocks

is_ratio(11) = is_ratio(10) for short blocks

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