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Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 3: 3D audio

AMENDMENT 2: MPEG-H 3D Audio File Format Support

Technologies de l'information — Codage à haute efficacité et livraison des médias dans des environnements hétérogènes —

Partie 3

AMENDEMENT 2

ICS 35.040

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Amendment 2 to ISO/IEC 23008-3:201x 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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Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 3: 3D audio, AMENDMENT 2: MPEG-H 3D Audio File Format Support

1 Changes to

Add the following clause to ISO/IEC 23008-3:

2 Carriage of MPEG-H 3D Audio in ISO base media file format

2.1 Introduction

This chapter specifies the carriage of MPEG-H 3D Audio in the ISO base media file format. Clause [x] describes the signalling of random access points for Immediate Play-out Frames (IPF) and independently decodable frames (IF) Clause [x] describes the additional signalling of dynamic range control and loudness information that might be present in the encoded bitstream. Clause [x] describes the additional signalling of audio scene information data that might be present in the encoded bitstream.

2.2 Random Access and Stream Access

Frames that use AudioPreRoll() following the restrictions in [ref above] are considered to be Immediate Play-out Frames (IPF) and shall be signalled by means of the sync sample box according to [14496-12:2015, section 8.6.2].

Independently decodable Frames (IF) as described in [ref above] shall be signalled by means of the roll sample group according to [14496-12:2015].

2.3 Overview of new box structures

mha1, mha2			*	sample entry
	mhaC			configuration
	mhaD			dynamic range and loudness
	maeM			multi-stream
	mael			audio scene information
		maeG	*	group definition
		maeS		switch group definition
		maeP		preset definition

2.4 MHA decoder configuration record

2.4.1 Definition

This clause specifies the decoder configuration information for MPEG-H 3D Audio (MHA) content.

This record contains a version field. This version of the specification defines version 1 of this record. Incompatible changes to the record will be indicated by a change of version number. Readers must not attempt to decode this record or the streams to which it applies if the version number is unrecognised.

2.4.2 Syntax

```
aligned(8) class MHADecoderConfigurationRecord {
    unsigned int(8)    configurationVersion = 1;
    unsigned int(8)    mpeg3daProfileLevelIndication;
    unsigned int(8)    referenceChannelLayout;
    unsigned int(16)   mpeg3daConfigLength;
    bit(8*mpeg3daConfigLength) mpeg3daConfig;
}
```

2.4.3 Semantics

configurationVersion	shall be set to 1 in this version of the specification.
mpeg3daProfileLevelIndication	defined in [1] clause 5.2.2.
referenceChannelLayout	ChannelConfiguration value defined in [2].
mpeg3daLength	length in bytes of mpeg3daConfig.
mpeg3daConfig	the MPEG-H 3DA configuration defined in [1].

2.5 Extension of AudioSampleEntry

2.5.1 Definition

Box Types: 'mhaC', 'mha1', 'mha2'
 Container: Sample Table Box ('stbl')
 Mandatory: The mha1 box is mandatory
 Quantity: One or more sample entries may be present

The MHASampleEntry shall contain a MHAConfigurationBox, as defined below. This includes the MHADecoderConfigurationRecord as defined in clause [ref above]. If the sample entry type is 'mha1', multiple streams shall not be used. If the sample entry name is 'mha2', multiple streams may be used.

If an 'mha1' or 'mha2' MHASampleEntry is present, each sample of the appropriate Track shall contain exactly one mpeg3daFrame as defined in [1]. An optional MPEG4BitRateBox may be present in the MHASampleEntry to signal the bit rate information of the MHA stream. Extension descriptors that should be inserted into the Elementary Stream Descriptor, when used in MPEG-4, may also be present. Other boxes may be present in the MHASampleEntry. When multiple streams are used, the MHADecoderConfigurationRecord for each track shall correspond to the appropriate mpeg3daFrame of that track.

The following optional boxes inherited from AudioSampleEntry from ISO/IEC 14496-12/AMD 4:2015 shall not be present

- DownMixInstructions()
- DRCCoefficientsBasic()
- DRCInstructionsBasic()
- DRCCoefficientsUniDRC()
- DRCInstructionsUniDRC()

2.5.2 Syntax

```
class MHAConfigurationBox() extends Box('mhaC') {
    MHADecoderConfigurationRecord() MHAConfig;
}
```

```

class MPEG4BitRateBox() extends Box('btrt') {
    unsigned int(32) bufferSizeDB;
    unsigned int(32) maxBitrate;
    unsigned int(32) avgBitrate;
}

class MPEG4ExtensionDescriptorsBox() extends Box('m4ds') {
    Descriptor Descr[0 .. 255];
}

MHASampleEntry() extends AudioSampleEntry('mha1') {
    MHAConfigurationBox config;
    MPEG4BitRateBox(); // optional
    MPEG4ExtensionDescriptorsBox (); // optional
}

```

2.5.3 Semantics

ChannelCount	inherited from AudioSampleEntry, shall be set to 0 (inapplicable) The MPEG-H 3D Audio decoder is capable of rendering a scene to any given speaker setup. The referenceChannelLayout carried in the MHADecoderConfigurationRecord shall be used to signal the preferred reproduction layout for this stream and replaces the ChannelCount defined in clause [ref above]
config	defined in clause [ref above]
Descr	is a descriptor which should be placed in the ElementaryStreamDescriptor when this stream is used in an MPEG-4 systems context. This does not include SLConfigDescriptor or DecoderConfigDescriptor, but includes the other descriptors in order to be placed after the SLConfigDescriptor
bufferSizeDB	gives the size of the decoding buffer for the elementary stream in bytes
maxBitrate	gives the maximum rate in bits/second over any window of 1 second
minBitrate	gives the average rate in bits/second over any window of 1 second

2.6 Dynamic Range Control and Loudness

2.6.1 MHA Dynamic Range Control and Loudness

2.6.1.1 Definition

Box Type: `mhaD`
 Container: MHA sample entry (`mha1` or `mha2`)
 Mandatory: No
 Quantity: Zero or one

This box specifies the dynamic range control and loudness information that may be contained in the MPEG-H 3D Audio (MHA) track. The provided information represents only a subset of the in-stream configuration according to clause 6.3.

2.6.1.2 Syntax

```

aligned(8) class MHADynamicRangeControlAndLoudnessBox()
    extends FullBox('mhaD', version = 0, 0) {
    unsigned int(2) reserved = 0;
    unsigned int(6) drcInstructionsUniDrcCount;
    unsigned int(2) reserved = 0;
    unsigned int(6) loudnessInfoCount;
    unsigned int(2) reserved = 0;
    unsigned int(6) loudnessInfoAlbumCount;
    unsigned int(3) reserved = 0;
    unsigned int(5) downmixIdCount;

    for (i=0; i < drcInstructionsUniDrcCount; i++) {

```

```

unsigned int(6) reserved = 0;
unsigned int(2) drcInstructionsType;
if (drcInstructionsType == 2) {
    unsigned int(1) reserved = 0;
    unsigned int(7) mae_groupID;
}
if (drcInstructionsType == 3) {
    unsigned int(3) reserved = 0;
    unsigned int(5) mae_groupPresetID;
}
unsigned int(2) reserved = 0;
unsigned int(6) drcSetId;
unsigned int(1) reserved = 0;
unsigned int(7) downmixId;
unsigned int(5) reserved = 0;
unsigned int(3) additionalDownmixIdCount;
for (j=0; j < additionalDownmixIdCount; j++) {
    unsigned int(1) reserved = 0;
    unsigned int(7) additionalDownmixId;
}
unsigned int(16) drcSetEffect;
unsigned int(7) reserved = 0;
unsigned int(1) limiterPeakTargetPresent;
if (limiterPeakTargetPresent == 1) {
    unsigned int(8) bsLimiterPeakTarget;
}
unsigned int(7) reserved = 0;
unsigned int(1) drcSetTargetLoudnessPresent;
if (drcSetTargetLoudnessPresent == 1) {
    unsigned int(2) reserved = 0;
    unsigned int(6) bsDrcSetTargetLoudnessValueUpper;
    unsigned int(2) reserved = 0;
    unsigned int(6) bsDrcSetTargetLoudnessValueLower;
}
unsigned int(1) reserved = 0;
unsigned int(6) dependsOnDrcSet;
if (dependsOnDrcSet == 0) {
    unsigned int(1) noIndependentUse;
} else {
    unsigned int(1) reserved = 0;
}
}

for (i=0; i < loudnessInfoCount; i++) {
    unsigned int(6) reserved = 0;
    unsigned int(2) loudnessInfoType;
    if (loudnessInfoType == 1 || loudnessInfoType == 2) {
        unsigned int(1) reserved = 0;
        unsigned int(7) mae_groupID;
    } else if (loudnessInfoType == 3) {
        unsigned int(3) reserved = 0;
        unsigned int(5) mae_groupPresetID;
    }
    LoudnessBaseBox();
}

for (i=0; i < loudnessInfoAlbumCount; i++) {
    LoudnessBaseBox();
}

for (i=0; i < downmixIdCount; i++) {
    unsigned int(1) reserved = 0;
    unsigned int(7) downmixId;
    unsigned int(2) downmixType;
    unsigned int(6) CICIPspeakerLayoutIdx;
}
}

```


2.6.1.3 Semantics

drcInstructionsUniDrcCount	number of drcInstructions in the MHA track
loudnessInfoCount	number of loudnessInfo blocks in the MHA track
loudnessInfoAlbumCount	number of loudnessInfoAlbum blocks in the MHA track
downmixIdCount	number of downmixId definitions in the MHA track
drcInstructionsType	defined in [1] clause 6.3 a value of '1' is not defined
mae_groupID	defined in [1] clause 15.3
mae_groupPresetID	defined in [1] clause 15.3
drcSetId	defined in [4] Annex A
downmixId	defined in [1] clause 5.3.5
additionalDownmixId	defined in [4] Annex A
drcSetEffect	defined in [4] Annex A
bsLimiterPeakTarget	defined in [4] Annex A
bsDrcSetTargetLoudnessValueUpper	defined in [4] Annex A
bsDrcSetTargetLoudnessValueLower	defined in [4] Annex A
dependsOnDrcSet	defined in [4] Annex A
noIndependentUse	defined in [4] Annex A
downmixType	defined in [1] clause 5.3.5
CICPSpeakerLayoutIdx	defined in [1] clause 5.3.5
LoudnessBox()	defined in ISO/IEC 14496-12:2012/Amd.4:2015

2.7 MHA Multi-Stream Signalling

2.7.1 Definition

Box Type: 'maeM'
 Container: MHA sample entry ('mha1' or 'mha2')
 Mandatory: No
 Quantity: Zero or one

This box provides information on the location of each mae_groupID in case of splitting the audio scene over multiple streams or files. **If multiple streams are used, this box shall be present.**

2.7.2 Syntax

```
aligned(8) class MHAMultiStreamBox()
  extends FullBox('maeL', version=0, 0) {
  unsigned int(1) isMainStream;
  unsigned int(7) thisStreamID;

  if (isMainStream) {
    unsigned int(1) reserved = 0;
    unsigned int(7) mae_numGroups;
    unsigned int(1) reserved = 0;
    unsigned int(7) numAuxiliaryStreams;

    for (i=0; i< mae_numGroups; i++) {
      unsigned int(7) mae_groupID;
      unsigned int(1) isInMainStream;
      if (!isInMainStream) {
        unsigned int(1) reserved = 0;
        unsigned int(7) auxiliaryStreamID;
      }
    }
  }
}
```