INTERNATIONAL STANDARD

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AMENDMENT 5
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Information technology — Generic coding of moving pictures and associated audio information —

Part 1: Systems

AMENDMENT 5: Carriage of MPEGH 3D audio over MPEG2 systems

Technologies de l'information — Codage générique des images animées et du son associé —

Partie 1: Systèmes

AMENDEMENT 5: Transport de l'audio MPEGH 3D à travers les systèmes MPEG2

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Amendment 5 to ISO/IEC 13818-1:2015 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T. The identical text is published as Rec. ITU-T H.222.0 (07/2016)/Amd.5.

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Information technology – Generic coding of moving pictures and associated audio information: Systems

Amendment 5

Carriage of MPEG-H 3D audio over MPEG-2 systems

1) Clause 1.2.3

In clause 1.2.3, add:

- ISO/IEC 23001-8:2016, *Information technology – MPEG systems technologies – Part 8: Coding-independent code-points*.
- ISO/IEC 23003-3:2012, *Information technology – MPEG audio technologies – Part 3: Unified speech and audio coding*.
- ISO/IEC 23003-4:2015, *Information technology – MPEG audio technologies – Part 4: Dynamic Range Control*.
- ISO/IEC 23008-3:2105, *Information technology – High efficiency coding and media delivery in heterogeneous environments – Part 3: 3D audio*.

2) Table 2-22

Replace 2-22 with the following:

Table 2-22 – Stream_id assignments

Stream_id	Note	stream coding
1011 1100	1	program_stream_map
1011 1101	2,9	private_stream_1
1011 1110		padding_stream
1011 1111	3	private_stream_2
110x xxxx		ISO/IEC 13818-3 or ISO/IEC 11172-3 or ISO/IEC 13818-7 or ISO/IEC 14496-3 or ISO/IEC 23008-3 audio stream number x xxxx
1110 xxxx		Rec. ITU-T H.262 | ISO/IEC 13818-2, ISO/IEC 11172-2, ISO/IEC 14496-2, Rec. ITU-T H.264 | ISO/IEC 14496-10 or Rec. ITU-T H.265 | ISO/IEC 23008-2 video stream number xxxx
1111 0000	3	ECM_stream
1111 0001	3	EMM_stream
1111 0010	5	Rec. ITU-T H.222.0 | ISO/IEC 13818-1 Annex A or ISO/IEC 13818-6_DSMCC_stream
1111 0011	2	ISO/IEC_13522_stream
1111 0100	6	Rec. ITU-T H.222.1 type A
1111 0101	6	Rec. ITU-T H.222.1 type B
1111 0110	6	Rec. ITU-T H.222.1 type C
1111 0111	6	Rec. ITU-T H.222.1 type D
1111 1000	6	Rec. ITU-T H.222.1 type E
1111 1001	7	ancillary_stream
1111 1010		ISO/IEC 14496-1_SL-packetized_stream
1111 1011		ISO/IEC 14496-1_FlexMux_stream
1111 1100		metadata stream
1111 1101	8	extended_stream_id

Table 2-22 – Stream_id assignments

Stream_id	Note	stream coding
1111 1110		reserved data stream
1111 1111	4	program_stream_directory

The notation x means that the values '0' or '1' are both permitted and results in the same stream type. The stream number is given by the values taken by the x's.

NOTE 1 – PES packets of type program_stream_map have unique syntax specified in 2.5.4.1.

NOTE 2 – PES packets of type private_stream_1 and ISO/IEC_13552_stream follow the same PES packet syntax as those for Rec. ITU-T H.262 | ISO/IEC 13818-2 video and ISO/IEC 13818-3 audio streams.

NOTE 3 – PES packets of type private_stream_2, ECM_stream and EMM_stream are similar to private_stream_1 except no syntax is specified after PES_packet_length field.

NOTE 4 – PES packets of type program_stream_directory have a unique syntax specified in 2.5.5.

NOTE 5 – PES packets of type DSM-CC_stream have a unique syntax specified in ISO/IEC 13818-6.

NOTE 6 – This stream_id is associated with stream_type 0x09 in Table 2-34.

NOTE 7 – This stream_id is only used in PES packets, which carry data from a program stream or an ISO/IEC 11172-1 System Stream, in a transport stream (refer to 2.4.3.8).

NOTE 8 – The use of stream_id 0xFD (extended_stream_id) identifies that this PES packet employs an extended syntax to permit additional stream types to be identified.

NOTE 9 – JPEG 2000 video streams (stream_type = 0x21) are carried using the same PES packet syntax as private_stream_1.

3) Table 2-34

In Table 2-34 add the following:

Table 2-34 – Stream type assignments

Value	Description
0x2D	ISO/IEC 23008-3 Audio with MHAS transport syntax – main stream
0x2E	ISO/IEC 23008-3 Audio with MHAS transport syntax – auxiliary stream
0x2F-0x7E	Rec. ITU-T H.222.0 | ISO/IEC 13818-1 Reserved

4) Clause 2.6.90

Replace Table 2-105 with:

Table 2-105 – Extension descriptor

Syntax	No. of bits	Mnemonic
Extension_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
extension_descriptor_tag	**8**	**uimsbf**
if (extension_descriptor_tag == 0x02) {		
ObjectDescriptorUpdate()		
}		
else if (extension_descriptor_tag == 0x03) {		
HEVC_timing_and_HRD_descriptor()		
}		
else if (extension_descriptor_tag == 0x04) {		

Table 2-105 – Extension descriptor

Syntax	No. of bits	Mnemonic
af_extension_descriptor()		
}		
else if (extension_descriptor_tag == 0x05) {		
HEVC_operation_point_descriptor()		
}		
else if (extension_descriptor_tag == 0x06) {		
HEVC_hierachy_extension_descriptor()		
}		
else if (extension_descriptor_tag == 0x07) {		
Green_extension_descriptor ()		
}		
else if (extension_descriptor_tag == 0x08) {		
MPEG-H_3dAudio_descriptor()		
}		
else if (extension_descriptor_tag == 0x09) {		
MPEG-H_3dAudio_config_descriptor()		
}		
else if (extension_descriptor_tag == 0x0A) {		
MPEG-H_3dAudio_scene_descriptor()		
}		
else if (extension_descriptor_tag == 0x0B) {		
MPEG-H_3dAudio_text_label_descriptor()		
}		
else if (extension_descriptor_tag == 0x0C) {		
MPEG-H_3dAudio_multi-stream_descriptor()		
}		
else if (extension_descriptor_tag == 0x0D) {		
MPEG-H_3dAudio_drc_loudness_descriptor()		
}		
else if (extension_descriptor_tag == 0x0E) {		
MPEG-H_3dAudio_command_descriptor()		
}		
else {		
for (i=0; i<N; i++) {		
reserved	**8**	**bslbf**
}		
}		
}		

5) Clause 2.6.91

Add the following immediately before Table 2-106:

MPEG-H_3dAudio_descriptor() – This structure is defined in 2.6.106 and 2.6.107.

MPEG-H_3dAudio_config_descriptor() – This structure is defined in 2.6.108 and 2.6.109.

MPEG-H_3dAudio_scene_descriptor() – This structure is defined in 2.6.110 and 2.6.111.

MPEG-H_3dAudio_text_label_descriptor() – This structure is defined in 2.6.112 and 2.6.113.

MPEG-H_3dAudio_multi-stream_descriptor() – This structure is defined in 2.6.114 and 2.6.115.

MPEG-H_3dAudio_drc_loudness_descriptor() – This structure is defined in 2.6.116 and 2.6.117.

MPEG-H_3dAudio_command_descriptor() – This structure is defined in 2.6.118.

Replace Table 2-106 with the following:

Table 2-106 – Extension descriptor tag values

Extension_descriptor_tag	TS	PS	Identification
0	n/a	n/a	Reserved
1	n/a	X	Forbidden
2	X	X	ODUpdate_descriptor
3	X	n/a	HEVC_timing_and_HRD_descriptor()
4	X	n/a	af_extensions_descriptor()
5	X	n/a	HEVC_operation_point_descriptor()
6	X	n/a	hierarchy_extension_descriptor()
7	X	n/a	Green_extension_descriptor()
8	X	n/a	MPEG-H_3dAudio_descriptor()
9	X	n/a	MPEG-H_3dAudio_config_descriptor()
0x0A	X	n/a	MPEG-H_3dAudio_scene_descriptor()
0x0B	X	n/a	MPEG-H_3dAudio_text_label_descriptor()
0x0C	X	n/a	MPEG-H_3dAudio_multi-stream_descriptor()
0x0D	X	n/a	MPEG-H_3dAudio_drc_loudness_descriptor()
0x0E	X	n/a	MPEG-H_3dAudio_command_descriptor()
0x0F-0xFF	n/a	n/a	Rec. ITU-T H.222.0 | ISO/IEC 13818-1 Reserved

6) Clauses 2.6.106 to 2.6.118

Add the following clauses after 2.6.105:

2.6.106 MPEG-H 3D audio descriptor

The MPEG-H 3D audio descriptor provides information on basic coding information in the associated ISO/IEC 23008-3 stream. This descriptor shall be present in the associated PMT for MPEG-H 3D audio content with stream_type equal to 0x2D.

Table 2-111*sexies*– MPEG-H 3D audio descriptor

Syntax	No of bits	Mnemonic
MPEG-H_3dAudio_descriptor() {		
mpegh3daProfileLevelIndication	**8**	**uimsbf**
interactivityEnabled	**1**	**bslbf**
reserved	**9**	**bslbf**
referenceChannelLayout	**6**	**uimsbf**
for (i=0; i<N; i++) {		
reserved	**8**	**bslbf**
}		
}		

2.6.107 Semantics for MPEG-H 3D audio descriptor

mpegh3daProfileLevelIndication – The audio profile and level of the associated ISO/IEC 23008-3 audio stream, encoded as specified for the mpegh3daProfileLevelIndication field in clause 5.3.2 in ISO/IEC 23008-3.

referenceChannelLayout – Reference channel configuration value as defined as "ChannelConfiguration" in ISO/IEC 23001-8 ("Codec Independent Code Points").

interactivityEnabled – If set to 1, this flag indicates that the 3D audio stream contains elements with associated metadata which enables user interactivity. If this flag is set to 0, no user interactivity of any kind is available. This flag may be used to determine the need for initializing the user interactivity interface in the Systems decoder.

2.6.108 MPEG-H 3D audio config descriptor

The MPEG-H 3D audio config descriptor provides information on the complete configuration data of one ISO/IEC 23008-3 stream.

Table 2-111*septies* – MPEG-H 3D audio config descriptor

Syntax	No of bits	Mnemonic
MPEG-H_3dAudio_config_descriptor() {		
mpegh3daConfig()		
}		

2.6.109 Semantics for MPEG-H 3D audio config descriptor

mpegh3daConfig() – The mpegh3daConfig() of the associated ISO/IEC 23008-3 audio stream, as specified in clause 5.2.2.1 in ISO/IEC 23008-3.

2.6.110 MPEG-H 3D audio scene descriptor

The MPEG-H 3D audio scene descriptor provides information on user selectable and/or modifiable audio objects in an ISO/IEC 23008-3 stream.

Table 2-111*octies* – MPEG-H 3d audio scene descriptor

Syntax	No of bits	Mnemonic
MPEG-H_3dAudio_scene_descriptor() {		
groupDefinitionPresent	**1**	**bslbf**
switchGroupDefinitionPresent	**1**	**bslbf**
presetGroupDefinitionPresent	**1**	**bslbf**
reserved	**5**	**bslbf**
3dAudioSceneInfoID	**8**	**bslbf**
if (groupDefinitionPresent) {		
reserved	**1**	**bslbf**
numGroups	**7**	**uimsbf**
for (i=0; i < numGroups; i++) {		
reserved	**1**	**bslbf**
mae_groupID	**7**	**uimsbf**
reserved	**3**	**bslbf**
mae_allowOnOff	**1**	**bslbf**
mae_defaultOnOff	**1**	**bslbf**
mae_allowPositionInteractivity	**1**	**bslbf**
mae_allowGainInteractivity	**1**	**bslbf**
mae_hasContentLanguage	**1**	**bslbf**
reserved	**4**	**bslbf**
mae_contentKind	**4**	**uimsbf**
if (mae_allowPositionInteractivity) {		
reserved	**1**	**bslbf**
mae_interactivityMinAzOffset	**7**	**uimsbf**
reserved	**1**	**bslbf**
mae_interactivityMaxAzOffset	**7**	**uimsbf**
reserved	**3**	**bslbf**
mae_interactivityMinElOffset	**5**	**uimsbf**
reserved	**3**	**bslbf**

Table 2-111*octies* – MPEG-H 3d audio scene descriptor

Syntax	No of bits	Mnemonic
mae_interactivityMaxElOffset	**5**	**uimsbf**
mae_interactivityMinDistOffset	**4**	**uimsbf**
mae_interactivityMaxDistOffset	**4**	**uimsbf**
}		
if (mae_allowGainInteractivity) {		
reserved	**2**	**bslbf**
mae_interactivityMinGain	**6**	**uimsbf**
reserved	**3**	**bslbf**
mae_interactivityMaxGain	**5**	**uimsbf**
}		
if (mae_hasContentLanguage) {		
mae_contentLanguage	**24**	**uimsbf**
}		
}		
}		
if (switchGroupDefinitionPresent) {		
reserved	**3**	**bslbf**
numSwitchGroups	**5**	**uimsbf**
for (i=0; i < numSwitchGroups; i++) {		
reserved	**1**	**bslbf**
mae_switchGroupID	**5**	**uimsbf**
mae_switchGroupAllowOnOff	**1**	**bslbf**
mae_switchGroupDefaultOnOff	**1**	**bslbf**
reserved	**3**	**bslbf**
mae_bsSwitchGroupNumMembers	**5**	**uimsbf**
for (i = 0; i < mae_bsSwitchGroupNumMembers + 1; i++) {		
reserved	**1**	**bslbf**
mae_switchGroupMemberID	**7**	**uimsbf**
}		
reserved	**1**	**bslbf**
mae_switchGroupDefaultGroupID	**7**	**uimsbf**
}		
}		
if (presetGroupDefinitionPresent) {		
reserved	**3**	**bslbf**
mae_numGroupPresets	**5**	**uimsbf**
for (i = 0; i < mae_numGroupPresets; i++) {		
reserved	**3**	**bslbf**
mae_groupPresetID	**5**	**uimsbf**
reserved	**3**	**bslbf**
mae_groupPresetKind	**5**	**uimsbf**
reserved	**4**	**bslbf**
mae_numGroupPresetConditions	**4**	**uimsbf**
for (j = 0; j < mae_numGroupPresetConditions+1; j++) {		
mae_groupPresetGroupID	**7**	**uimsbf**
mae_groupPresetConditionOnOff	**1**	**bslbf**
if (mae_groupPresetConditionOnOff) {		

Table 2-111*octies* – MPEG-H 3d audio scene descriptor

Syntax	No of bits	Mnemonic
reserved	**4**	**bslbf**
mae_groupPresetDisableGainInteractivity	**1**	**bslbf**
mae_groupPresetGainFlag	**1**	**bslbf**
mae_groupPresetDisablePositionInteractivity	**1**	**bslbf**
mae_groupPresetPositionFlag	**1**	**bslbf**
if (mae_groupPresetGainFlag) {		
mae_groupPresetGain	**8**	**uimsbf**
}		
if(mae_groupPresetPositionFlag){		
mae_groupPresetAzOffset	**8**	**uimsbf**
reserved	**2**	**bslbf**
mae_groupPresetElOffset	**6**	**uimsbf**
reserved	**4**	**bslbf**
mae_groupPresetDistFactor	**4**	**uimsbf**
}		
}		
}		
}		
}		
for (i=0; i<N; i++) {		
reserved	**8**	**bslbf**
}		
}		

2.6.111 Semantic definition of fields in MPEG-H 3D audio scene descriptor

groupDefinitionPresent – A one-bit flag signalling the presence of interactivity information of one group in this descriptor.

switchGroupDefinitionPresent – A one-bit flag signalling the presence of switch group information in this descriptor.

presetGroupDefinitionPresent – A one-bit flag signalling the presence of preset group information in this descriptor.

3dAudioSceneInfoID – See ISO/IEC 23008-3, clause 15.3.

numGroups – This field signals the number of groups in the audio scene description. This field can take values between 1 and 127, and shall be less or equal to the value of mae_numGroups present in the associated ISO/IEC 23008-3 stream.

mae_groupID – See ISO/IEC 23008-3, clause 15.3.

mae_allowOnOff – See ISO/IEC 23008-3, clause 15.3.

mae_defaultOnOff – See ISO/IEC 23008-3, clause 15.3.

mae_allowPositionInteractivity – See ISO/IEC 23008-3, clause 15.3.

mae_allowGainInteractivity – See ISO/IEC 23008-3, clause 15.3.

mae_hasContentLanguage – See ISO/IEC 23008-3, clause 15.3.

mae_contentKind – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMinAzOffset – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMaxAzOffset – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMinElOffset – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMaxElOffset – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMinDistOffset – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMaxDistOffset – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMinGain – See ISO/IEC 23008-3, clause 15.3.

mae_interactivityMaxGain – See ISO/IEC 23008-3, clause 15.3.

mae_contentLanguage – See ISO/IEC 23008-3, clause 15.3.

numSwitchGroups – This field signals the number of switch groups minus one in the overall scene. This field can take values between 0 and 31, resulting in a maximum number of 32 switch groups. It shall be less than or equal to the value of mae_numSwitchGroups present in the associated ISO/IEC 23008-3 stream.

mae_switchGroupID – See ISO/IEC 23008-3, clause 15.3.

mae_switchGroupAllowOnOff – See ISO/IEC 23008-3, clause 15.3.

mae_switchGroupDefaultOnOff – See ISO/IEC 23008-3, clause 15.3; if mae_switchGroupAllowOnOff is '0', then mae_ switchGroupDefaultOnOff shall be set to '0'.

mae_bsSwitchGroupNumMembers – See ISO/IEC 23008-3, clause 15.3.

mae_switchGroupMemberID – See ISO/IEC 23008-3, clause 15.3.

mae_switchGroupDefaultGroupID – See ISO/IEC 23008-3, clause 15.3.

mae_numGroupPresets – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetID – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetKind – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetNumConditions – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetGroupID – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetConditionOnOff – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetDisableGainInteractivity – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetGainFlag – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetDisablePositionInteractivity – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetPositionFlag – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetGain – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetAzOffset – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetElOffset – See ISO/IEC 23008-3, clause 15.3.

mae_groupPresetDistFactor – See ISO/IEC 23008-3, clause 15.3.

Data fields provided both in this descriptor and as in-band information in the ISO/IEC 23008-3 stream shall be set to the same value.

2.6.112 MPEG-H 3D audio text label descriptor

The MPEG-H 3D audio scene descriptor provides text labels for the audio objects and presets in an ISO/IEC 23008-3 stream.

Table 2-111*novies* – MPEG-H 3d audio text label descriptor

Syntax	No of bits	Mnemonic
MPEG-H_3dAudio_text_label_descriptor() {		
3dAudioSceneInfoID	**8**	**uimsbf**
reserved	**4**	**bslbf**
numDescLanguages	**4**	**uimsbf**
for (i=0; i< numDescLanguage; i++) {		
descriptionLanguage	**24**	**uimsbf**
reserved	**1**	**bslbf**
numGroupDescriptions	**7**	**uimsbf**
for (n = 0; n < numGroupDescriptions; n++) {		
reserved	**1**	**bslbf**
mae_descriptionGroupID;	**7**	**uimsbf**
groupDescriptionDataLength	**8**	**uimsbf**
for (c = 0; c < groupDescriptionDataLength; c++) {		
groupDescriptionData	**8**	**uimsbf**
}		
}		
reserved	**3**	**bslbf**
numSwitchGroupDescriptions	**5**	**uimsbf**
for (n = 0; n < numSwitchGroupDescriptions; n++) {		
reserved	**3**	**bslbf**
mae_descriptionSwitchGroupID;	**5**	**uimsbf**
switchGroupDescriptionDataLength	**8**	**uimsbf**
for (c = 0; c < switchGroupDescriptionDataLength; c++) {		
switchGroupDescriptionData	**8**	**uimsbf**
}		
}		
reserved	**3**	**bslbf**
numGroupPresetsDescriptions	**5**	**uimsbf**
for (n = 0; n < numGroupPresetsDescriptions; n++) {		
reserved	**3**	**bslbf**
mae_descriptionGroupPresetID	**5**	**uimsbf**
groupPresetDescriptionDataLength	**8**	**uimsbf**
for (c = 0; c < groupPresetDescriptionLength; c++) {		
groupPresetDescriptionData	**8**	**uimsbf**
}		
}		
}		
for (i=0; i<N; i++) {		
reserved	**8**	**bslbf**
}		
}		

2.6.113 Semantic definition of fields in MPEG-H 3D audio text label descriptor

3dAudioSceneInfoID – see ISO/IEC 23008-3, clause 15.3.

maeGroupDescriptionPresent – A one-bit flag signalling the presence of description text for groups.

maeSwitchgroupDescriptionPresent – A one-bit flag signalling the presence of description text for switch groups.

maeGroupPresetDescriptionPresent – A one-bit flag signalling the presence of description text for group presets.

numDescLanguages – The number of available languages for description text.

descriptionLanguage – Identifies the language or languages used by the description text of a metadata element group. It contains a 3-character code as specified by ISO 639-2. Both ISO 639-2/B and ISO 639-2/T may be used. Each character is coded into 8 bits according to ISO/IEC 8859-1 and inserted in order into the 24-bit field.

numGroupDescriptions – The number of available descriptions for groups.

mae_descriptionGroupID – See ISO/IEC 23008-3, clause 15.3.

groupDescriptionDataLength – The length, specified in bytes, of the following group description.

groupDescriptionData – This field contains a description of a metadata element group, i.e., a string describing the content by a high-level description. The format shall follow UTF-8 according to ISO/IEC 10646.

numSwitchGroupDescriptions – The number of available descriptions for switch groups.

mae_descriptionSwitchGroupID – See ISO/IEC 23008-3, clause 15.3.

switchGroupDescriptionDataLength – The length, specified in bytes, of the following switch group description.

switchGroupDescriptionData – This field contains a description of a switch group, i.e., a string describing the content by a high-level description. The format shall follow UTF-8 according to ISO/IEC 10646.

numGroupPresetsDescriptions – The number of available descriptions for group presets.

mae_descriptionGroupPresetID – See ISO/IEC 23008-3, clause 15.3.

groupPresetDescriptionDataLength – The length, specified in bytes, of the following group preset description.

groupPresetDescriptionData – This field contains a description of a metadata element group, i.e., a string describing the content by a high-level description. The format shall follow UTF-8 according to ISO/IEC 10646.

Data fields provided both in this descriptor and as in-band information in the IS/IEC 23008-3 stream shall be set to the same value.

2.6.114 MPEG-H 3D audio multi-stream descriptor

The MPEG-H 3D audio multi-stream descriptor provides information on the location of each mae_groupID in case of transmission over multiple streams.

In combination with this descriptor, an MPEG-H 3D audio scene descriptor explaining the actual representation of the overall audio scene is required to be present in the descriptor loop of the main stream.

Table 2-111*decies* – MPEG-H 3D audio multi-stream descriptor

Syntax	No of bits	Mnemonic
MPEG-H_3dAudio_multi-stream_descriptor() {		
thisIsMainStream	**1**	**bslbf**
thisStreamID	**7**	**uimsbf**
if (thisIsMainStream) {		
reserved	**1**	**slbf**
numAuxiliaryStreams	**7**	**uimsbf**
reserved	**1**	**bslbf**
mae_numGroups	**7**	**uimsbf**
for (i=0; i< mae_numGroups; i++) {		
mae_groupID	**7**	**uimsbf**
isInMainStream	**1**	**bslbf**
if (thisIsMainStream == '0') {		
isInTS	**1**	**bslbf**
auxiliaryStreamID	**7**	**uimsbf**
}		
}		
}		

Table 2-111*decies* – MPEG-H 3D audio multi-stream descriptor

Syntax	No of bits	Mnemonic

for (i=0; i<N; i++) {
reserved
}
}
	8	**bslbf**

2.6.115 Semantic definition of fields in MPEG-H 3D audio multi-stream descriptor

thisIsMainStream – If this flag is one, the stream is a main stream, otherwise it is an auxiliary stream.

thisStreamID – This integer provides a unique ID of all available ISO/IEC 23008-3 Audio streams with MHAS transport syntax, both main and auxiliary streams (stream_type 0x2D and 0x2E).

numAuxiliaryStreams – This integer provides information on how many auxiliary streams are available.

mae_numGroups – This field signals the number of groups in the overall audio scene (complete number of groups in the main stream plus all possible additional streams). This field can take values between 1 and 127. It shall be set to the same value as the corresponding field in the associated ISO/IEC 23008-3 stream.

mae_groupID – This integer provides information on the mae_groupID (as described in ISO/IEC 23008-3, section 15) the loop instance refers to.

isInMainStream – If this flag is set to 1, the audio data related to the group (as indicated through mae_groupID) is present in the main stream, otherwise the encoded data is transmitted in an auxiliary stream.

isInTS – If this flag is set to 1, the audio data related to the group (as indicated through mae_groupID) is present in the same transport stream. If this flag is set to 0, the data must be retrieved from an external source.

auxiliaryStreamID – In case of transmission of encoded audio data as identified by groupID in an auxiliary stream, this integer identifies the used auxiliary stream.

The location of the 'external source' may be signaled using the TEMI location descriptor and/or the TEMI BaseURL_descriptor as defined in clause U.3.

When the TEMI descriptor(s) are conveyed in a TEMI_AU as a separate elementary stream on a separated PID, an MPEG-H_3dAudio_extStreamID_descriptor() shall be present in the associated descriptor loop of the TEMI elementary stream which provides an ID in the field "auxiliaryStreamID" that is matching the "auxiliaryStreamID" provided in the MPEG-H_3dAudio_multi-stream_descriptor() of the main stream.

2.6.116 MPEG-H 3D audio DRC and Loudness descriptor

The MPEG-H 3D Audio Dynamic Range Control (DRC) and Loudness descriptor provides information on DRC and Loudness information contained in an ISO/IEC 23008-3 stream.

Table 2-111*undecies* – MPEG-H 3d audio DRC and Loudness descriptor()

Syntax	No of bits	Mnemonic
MPEG-H_3dAudio_drc_loudness_descriptor () {		
reserved	**7**	**bslbf**
mpegh3daDrcAndLoudnessInfoPresent	**1**	**bslbf**
if (mpegh3daDrcAndLoudnessInfoPresent) {		
reserved	**2**	**bslbf**
drcInstructionsUniDrcCount	**6**	**uimsbf**
reserved	**2**	**bslbf**
loudnessInfoCount	**6**	**uimsbf**
reserved	**3**	**bslbf**
downmixIdCount	**5**	**uimsbf**

Table 2-111*undecies* – MPEG-H 3d audio DRC and Loudness descriptor()

Syntax	No of bits	Mnemonic
for (i=0; i<drcInstructionsUniDrcCount; i++) {		
reserved	**6**	**bslbf**
drcInstructionsType	**2**	**uimsbf**
if (drcInstructionsType == 2) {		
reserved	**1**	**bslbf**
mae_groupID	**7**	**uimsbf**
} else if (drcInstructionsType == 3) {		
reserved	**3**	**bslbf**
mae_groupPresetID	**5**	**uimsbf**
}		
reserved	**2**	**bslbf**
drcSetId	**6**	**uimsbf**
reserved	**1**	**bslbf**
downmixId	**7**	**uimsbf**
reserved	**3**	**bslbf**
additionalDownmixIdCount	**3**	**uimsbf**
limiterPeakTargetPresent	**1**	**bslbf**
drcSetTargetLoudnessPresent	**1**	**bslbf**
for (j=0; j<additionalDownmixIdCount; j++) {		
reserved	**1**	**bslbf**
additionalDownmixId	**7**	**uimsbf**
}		
drcSetEffect	**16**	**uimsbf**
if (limiterPeakTargetPresent) {		
bsLimiterPeakTarget	**8**	**uimsbf**
}		
if (drcSetTargetLoudnessPresent) {		
reserved	**1**	**bslbf**
bsDrcSetTargetLoudnessValueUpper	**6**	**uimsbf**
drcSetTargetLoudnessValueLowerPresent	**1**	**bslbf**
if(drcSetTargetLoudnessValueLowerPresent) {		
reserved	**2**	**bslbf**
bsDrcSetTargetLoudnessValueLower	**6**	**uimsbf**
}		
}		
reserved	**1**	**bslbf**
dependsOnDrcSet	**6**	**uimsbf**
if (dependsOnDrcSet == 0) {		
noIndependentUse	**1**	**bslbf**
} else {		
reserved	**1**	**bslbf**
}		
}		
for (i=0; i<loudnessInfoCount; i++) {		
reserved	**6**	**bslbf**
loudnessInfoType	**2**	**uimsbf**
if (loudnessInfoType == 1 || loudnessInfoType == 2) {		
reserved	**1**	**bslbf**
mae_groupID	**7**	**uimsbf**
} else if (loudnessInfoType == 3) {		
reserved	**3**	**bslbf**
mae_groupPresetID	**5**	**uimsbf**
}		
loudnessInfo_size	**8**	**uimsbf**
loudnessInfo()		
}		

Table 2-111*undecies* – MPEG-H 3d audio DRC and Loudness descriptor()

Syntax	No of bits	Mnemonic
for (i=0; i<downmixIdCount; i++) {		
reserved	**1**	**bslbf**
downmixId	**7**	**uimsbf**
downmixType	**2**	**uimsbf**
CICPspeakerLayoutIdx	**6**	**uimsbf**
}		
}		
for (i=0; i<N; i++) {		
reserved	**8**	**bslbf**
}		
}		

2.6.117 Semantic definition of fields in MPEG-H 3D audio DRC and loudness descriptor

mpegh3daDrcAndLoudnessInfoPresent – A one-bit flag signalling the presence of dynamic range control and loudness information in this descriptor.

drcInstructionsUniDrcCount – This field signals the number of DRC sets in the stream. This field can take values between 0 and 63, resulting in a maximum number of 63 DRC sets.

loudnessInfoCount – This field signals the number of loudness info blocks in the stream. This field can take values between 0 and 63, resulting in a maximum number of 63 loudness info blocks.

downmixIdCount – This field signals the number of downmixId definitions in the stream. This field can take values between 0 and 31, resulting in a maximum number of 31 downmixId definitions.

drcInstructionsType – See ISO/IEC 23008-3.

mae_groupID – See ISO/IEC 23008-3.

mae_groupPresetID – see ISO/IEC 23008-3.

drcSetId – See ISO/IEC 23003-4.

downmixId – See ISO/IEC 23003-4 and ISO/IEC 23008-3.

additionalDownmixIdCount – See ISO/IEC 23003-4.

limiterPeakTargetPresent – See ISO/IEC 23003-4.

drcSetTargetLoudnessPresent – See ISO/IEC 23003-4.

additionalDownmixId – See ISO/IEC 23003-4.

drcSetEffect – See ISO/IEC 23003-4.

bsLimiterPeakTarget – See ISO/IEC 23003-4.

bsDrcSetTargetLoudnessValueUpper – See ISO/IEC 23003-4.

drcSetTargetLoudnessValueLowerPresent – See ISO/IEC 23003-4.

bsDrcSetTargetLoudnessValueLower – See ISO/IEC 23003-4.

dependsOnDrcSet – See ISO/IEC 23003-4.

noIndependentUse – See ISO/IEC 23003-4.

loudnessInfoType – See ISO/IEC 23008-3.

loudnessInfo_size – The number of bytes of the immediately following loudnessInfo().

loudnessInfo() – One loudnessInfo() structure as defined in ISO/IEC 23003-4.

downmixType – See ISO/IEC 23008-3.

CICPspeakerLayoutIdx – See ISO/IEC 23008-3.