# INTERNATIONAL STANDARD

## ISO/IEC 23008-3

First edition 2015-10-15 **AMENDMENT 1** 2016-08-01

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

Part 3: **3D audio** 

## iTeh STAMENDMENTAL MPEG-H, 3D audio (stprofile and levels)

<u>Isotechnologies de l'information</u> — Codage à haute efficacité et livraison des médias dans des environnements hétérogènes https://standards.iteh.avcatalog/standards/sist9/c9e368-a290-41aa-aaet-56e082f7-**Partie-3: Audio:3D**2015-amd-1-2016

AMENDEMENT 1: Niveaux et profil audio 3D MPEG-H



Reference number ISO/IEC 23008-3:2015/Amd.1:2016(E)

## iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>ISO/IEC 23008-3:2015/Amd 1:2016</u> https://standards.iteh.ai/catalog/standards/sist/97c9e3b8-a290-41aa-aaef-56e082f74de6/iso-iec-23008-3-2015-amd-1-2016



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Amendment 1 to ISO/IEC 23008-3:2015 was prepared by Joint Technical Committee ISO/IEC JTC 1, Information technology, Subcommittee SC 29, Coding of audio, picture, multimedia and hypermedia information.

https://standards.iteh.ai/catalog/standards/sist/97c9e3b8-a290-41aa-aaef-56e082f74de6/iso-iec-23008-3-2015-amd-1-2016

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

## Part 3: **3D audio**

## AMENDMENT 1: MPEG-H, 3D audio profile and levels

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Add the following section after Clause 18.

#### 19 MPEG-H 3D Audio Profile Definition

#### **19.1** Profile: Main Profile

The Main Profile for MPEG-H 3D Audio contains all normative bitstream elements and normative decoder tools defined in MPEG-H 3D Audio specification.

That means that the following tools will be included Main Profile decoders:

- MPEG-H 3D Audio Core Decoder and ards.iteh.ai)
- HOA Rendering
- ISO/IEC 23008-3:2015/Amd 1:2016
- SAOC 3D Renderers://standards.iteh.ai/catalog/standards/sist/97c9e3b8-a290-41aa-aaef-
- Static object metadata (MAE) and rendering
- Dynamic object metadata (OAM) and rendering
- Generic Loudspeaker Rendering/Format Conversion
- Immersive Loudspeaker Rendering/Format Conversion
- Binaural Rendering Time Domain and/or Frequency Domain
- H2B Binaural Rendering
- Loudness Metadata
- DRC processing

#### ISO/IEC 23008-3:2015/Amd.1:2016(E)

Mpeg Leve	gh3daProfile lIndication	Applicable Notes	Max. number of core channels	Max. sampling rate of core	Max number of loudspeaker output channels	Max. PCU in wMOPS <sup>a</sup>	Max. RCU		
1			8	48000	8	138			
2			16	48000	16	265			
3		1) 2) 3)	32	48000	24	448			
4		1) 2) 3)	64	48000	24	830			
5		1) 2) 3)	128	96000	64	3223			
Gene	eral restriction	ns for all leve	ls:		I	1			
	- HOA: The number of active predictions must not be larger than $ceil\left(\frac{(N+1)^2}{4}\right)$ (NumActivePred in Table 127 Syntax of HOAPredictionInfo(DirSigChannelIds, NumOfDirSigs)). N is the HOA order. For the definition of global HOA parameters refer to 12.4.1.1. - The HOA order must not be larger than 3 for Level 1, 4 for Level 2, 5 for Level 3, 6 for Level 4 and 7 for Level 5 (see HoaOrder in Table 119 Syntax of HOAConfig()). - The number of input objects (for SAOC encoding) must not be larger than 2 times the maximum num- ber of core coder channels <b>Teh STANDARD PREVIEW</b> - The number of predominant sounds of HOA must not be larger than 8 for Level 1, 10 for Level 2, 12 for Level 3, 14 for Level 4, and 16 for Level 10 2005.								
Dest			ISO	/IEC 23008-3:2	015/Amd 1:2016				
Rest	1) CAOC. The	ecific levels:	standards.iteh.a	i/catalog/standar	ds/sist/97c9e3b8-a	290-41aa-aaef-			
	<ul> <li>SAUC: The maximum number (on SAUC downmix channels) is 34nd-1-2016</li> <li>SAUC objects must be grouped, i.e. a set of SAUC objects is mixed into a group of maximum of 8 downmix channels and not to any other downmix channel. IOCs must not be transmitted between SAUC objects different groups.</li> <li>2) The maximum number (of the maximum number (of the maximum of 8 downmix channels) is 34nd-1-2016</li> </ul>								
	groups can exist								
N - +	3J FOR DRC-1	and DRC-3 the	e maximum ni	umber of char	inel groups for e	each is 16.			
Also,	: it is assumed the assumed the assection of the assection of the assection of the assection of the association of the associat	hat the both B Igle Binaural F	inaural Rende Renderer is av	erers (TD and ailable.	FD) are implem	ented. The tota	al complexity may		
The a BS.	The numbers for binaural processing are calculated on the basis of BRIR filters of 1 second length measured in a BS.1116 compliant room.								

<sup>a</sup> The maximum PCU numbers are based on theoretical calculations and estimations of the number of operations. They represent worst case total complexity numbers. All PCU figures are provided as informative data.

#### 19.1.1 Examples for Level 1 of Main Profile

#### Example 1:

8 input channels as a 7.1 mix are carried as channels and coded at a low bitrate. In the decoder a downmix is performed to 5.1 channels. Finally, a multi-band dynamic range compression is applied to the 6 loudspeaker output signals.

Decoder building block	Core Coder channels	Rendering	Domain switch	DRC	Post- processing	Total PCU in wMOPS
Description	8 (incl all tools) = 4 CPEs	8 ch -> 6 ch	6 ch FD-> TD	multi-band DRC 2	-none-	
PCU	46	5	9	2.2		62

Example 2:

A 2<sup>nd</sup> order HOA signal is carried in 8 core coder channels and is decoded to produce 9 HOA components.

The H2B binaural processing is applied to render the signal for a headphone output. Single band dynamic range compression is applied to the output.

Decoder building block	Core Coder channels	Rendering	Domain switch	DRC	Post- processing	Total PCU in wMOPS
Description	8 (including all tools) = 4SCE + 2CPE	4 Amb + 4 PS (HOA rendering matrix 9x8 not applied)	8 ch FD-> TD (if SBR, otherwise not applied)	DRC 2 full	H2B-Binaural Rendering of 9 HOA compo- nents	
PCU	12.6+21.6 = 34.2	15 III 4 I 4	12/0	0.5	21	82/70

#### 19.1.2 Examples for Level 2 of Main Profile 3:2015/Amd 1:2016

Example 1: https://standards.iteh.ai/catalog/standards/sist/97c9e3b8-a290-41aa-aaef-56e082f74de6/iso-iec-23008-3-2015-amd-1-2016

A 4<sup>th</sup> Order Higher Order Ambisonics (HOA) signal is coded at about 500 kbit/s, so no SBR is applied. The output domain of the core decoder is time domain so no domain switch is necessary. The HOA spatial decoder reproduces a 4<sup>th</sup> order HOA signal which is rendered to a 11.1 loudspeaker setup.

Decoder building block	Core Coder channels	Rendering	Domain switch	DRC	Post- processing	Total PCU in wMOPS
Description	8 (including all tools) = 2CPE + 4 SCE	4 Amb + 4 PS (HOA Decoding + Rendering to 11 Speakers)	-	DRC 2 full band		
PCU	8+19.4=27.4	24 + 13 = 37	0	0.5	0	65

#### ISO/IEC 23008-3:2015/Amd.1:2016(E)

#### Example 2:

A 4<sup>th</sup> Order Higher Order Ambisonics (HOA) signal is coded at about 250 kbit/s, so SBR is applied. The output domain of the core decoder is frequency domain and a domain switch is necessary. The HOA spatial decoder reproduces a 4<sup>th</sup> order HOA signal which is rendered to a 11.1 loudspeaker setup. Additionally 2 dialogue objects accompany the HOA scene.

Decoder building block	Core Coder channels	Rendering	Domain switch	DRC	Post- processing	Total PCU in wMOPS
Description	8(HOA) = 2CPE + 4 SCE plus 2 (Objects) = 2 SCE	4 Amb + 4 PS (HOA Decoding + Rendering to 11 Speakers) + 2 Objects	10 ch FD to TD	DRC 2 full band		
PCU	12.6+21.6+6.3=40.5	24 + 13 + 2 = 39	15	0.5	0	95

#### **19.1.3 Examples for Level 3 of Main Profile**

Example 1:

A 4<sup>th</sup> Order Higher Order Ambisonics (HOA) signal is coded at about 250 kbit/s, so SBR is applied. The output domain of the core decoder is frequency domain and a domain switch on the core coder transport channels is necessary. The HOA spatial decoder reproduces a 4<sup>th</sup> order HOA signal which is rendered to a 22.2 loudspeaker setup.

Decoder building block	Core Coder channels	Rendering	Domain switch	DRC	Post- processing	Total PCU in wMOPS
Description	8(HOA)=2CPE+4SCE plus https://star	4 Amb + 4 PS (HOA Decoding + Rendering to 22 Speakers)	8 ch FD to TD 08-3:2015/Amd 1:2 standards/sist/97c9e	DRC 2 full band 3b8-a290-4	1aa-aaef-	
PCU	12.6 + 21.6 = 34.2	24 + 26 = 50	12	1	0	97

#### TOP STANDADD DDEVIEW

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