IEC 61937-13

Edition 1.0 2018-04

INTERNATIONAL STANDARD

Digital audio – Interface for non-linear pcm encoded audio bitstreams applying IEC 60958 – Part 13: MPEG-H 3D Audio

IEC 61937-13:2018-04(en)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC 61937-13

Edition 1.0 2018-04

INTERNATIONAL STANDARD

Digital audio – Interface for non-linear pcm encoded audio bitstreams applying IEC 60958 – Part 13: MPEG-H 3D Audio

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 35.040.40

ISBN 978-2-8322-5534-6

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –

Part 13: MPEG-H 3D Audio

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61937-13 has been prepared by technical area 4: Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

CDV	Report on voting
100/2943/CDV	100/3068/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.

A list of all parts in the IEC 61937 series, published under the general title *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958*, can be found on the IEC website.

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.

INTRODUCTION

Modern digital video standards, such as ATSC and DVB, are preparing for next-generation TV broadcast systems. The latest evolutions in audio introduce fundamental changes to the way audio is produced, and may well revolutionize the user experience. The new MPEG-H audio standard offers not only immersive 3D Audio, but it also introduces the concept of audio objects that can be used to personalize the user experience.

The MPEG-H 3D Audio standard is the next generation MPEG audio codec, and it requires a framing format that supports more flexible signalling and delivery mechanisms than were needed for earlier systems. Therefore, the MPEG-H 3D Audio Transport Stream (MHAS) framing format was specified for use with the MPEG-H 3D Audio codec.

In order to be able to pass the MPEG-H 3D Audio bit stream from a set-top box to an A/V receiver connected via the IEC 60958 interface, this part of IEC 61937 employs the MHAS framing format.

DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –

Part 13: MPEG-H 3D Audio

1 Scope

This part of IEC 61937 specifies the method to convey non-linear PCM bitstreams encoded according to the MPEG-H 3D Audio format.

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.

IEC 60958 (all parts), *Digital audio interface*

IEC 61937-1, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 1: General*

IEC 61937-2, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 2: Burst-info*

ISO/IEC 23008-3:2015, *Information technology – High efficiency coding and media delivery in heterogeneous environments – Part 3: 3D audio*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 61937-1, IEC 61937-2 and the following 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
audio sample rate
sampling frequency of the linear PCM audio samples before encoding and after decoding

3.1.2
frame length
number of linear PCM audio samples per MPEG-H 3D Audio data frame

Note 1 to entry: MPEG-H 3D Audio can operate in several modes using any of 1 024, 2 048, 4 096, 768, 1 536 or 3 072 linear PCM audio samples per MPEG-H 3D Audio data frame.

3.1.3
latency
delay time of an external audio decoder to decode an MPEG-H 3D Audio data-burst defined as the sum of two values – the receiving delay time and the decoding delay time

3.1.4
MHASPacketLabel
field in an MPEG-H 3D Audio stream packet that provides an indication on which packets belong together

3.1.5
MHASPacketLength
field in an MPEG-H 3D Audio stream packet that indicates the length of the MHASPacketPayload in bytes

3.1.6
MHASPacketPayload
payload of the MHASPacket

3.1.7
MHASPacketType
field in an MPEG-H 3D Audio stream packet that specifies the payload type in the packet given in ISO/IEC 23008-3:2015, 14.3.1

3.1.8
MPEG-H 3D Audio data frame
sequence of one or more MPEG-H 3D Audio stream packets (MHAS packets), as defined in ISO/IEC 23008-3:2015, Clause 14 that represents frame length (or fewer) linear PCM audio samples

3.1.9
MPEG-H 3D Audio stream packet
building blocks of an MPEG-H 3D audio stream that comprises an MHASPacketType field, an MHASPacketLabel field, an MHASPacketLength field, and an MHASPacketPayload

3.1.10
MPEG-H 3D Audio Stream
self-contained stream format to transport ISO/IEC 23008-3 (MPEG-H 3D Audio) data as defined in ISO/IEC 23008-3:2015, Clause 14

3.1.11
PACTYP_MPEGH3DACFG
MHASPacketType registration for an MHAS Packet that embeds an MPEG-H 3D audio configuration structure in the MHASPacketPayload as defined in ISO/IEC 23008-3:2015, 14.4

3.1.12
PACTYP_MPEGH3DAFRAME
MHASPacketType registration for an MHAS Packet that embeds a frame of MPEG-H 3D audio in the MHASPacketPayload as defined in ISO/IEC 23008-3:2015, 14.4

3.1.13
PACTYP_AUDIOSCENEINFO
MHASPacketType registration for an MHAS Packet that embeds an MPEG-H 3D audio scene information structure in the MHASPacketPayload as defined in ISO/IEC 23008-3:2015, 14.4

3.1.14
PACTYP_AUDIOTRUNCATION
MHASPacketType registration for an MHAS Packet that indicates a potential truncation as defined in ISO/IEC 23008-3:2015, 14.4

Note 1 to entry: Truncation in this context means the removal of audio samples from the decoded PCM samples. Audio samples are removed either before or after a truncation point as signaled in the truncation packet.

3.1.15
truncated MPEG-H 3D Audio data frame
MPEG-H 3D Audio data frame that represents fewer than frame length linear PCM audio samples

Note 1 to entry: A truncated MPEG-H 3D Audio data frame contains at least one MHAS packet with MHASPacketType PACTYP_AUDIOTRUNCATION.

Note 2 to entry: Truncation in this context means the removal of audio samples from the decoded PCM samples.

3.2 Abbreviated terms

HBR high bit rate

MHAS MPEG-H 3D Audio stream

4 Mapping of the audio bit stream on to IEC 61937-1

4.1 General

Coding of the bit stream and data-burst is in accordance with IEC 61937-1 and IEC 61937-2.

4.2 Burst-info for MPEG-H 3D Audio

The 16-bit burst-info contains information about the data that will be found in the data-burst. See Table 1.

Table 1 – Values of data-type for MPEG-H 3D Audio

Data-type bits 0-4 according to IEC 61937-2 Value of Pc bits 0-4	Data-type bits 5-6 Value of Pc bits 5-6	Contents	Reference point R	Repetition period of data-burst measured in IEC 60958 frames
0-24	0-3	In accordance with IEC 61937-2		
25	0	MPEG-H 3D Audio	Bit 0 of Pa	See Table 5
	1	MPEG-H 3D Audio HBR	Bit 0 of Pa	See Table 8, Table 9, Table 10 and Table 11
	2, 3	According to IEC 61937-2		
26-31	0-3	In accordance with IEC 61937-2		

Bits 0 to 4 of the burst-info (Pc) signal the data-type used for transmission. For MPEG-H 3D Audio, the signalled data-type is 25.

The Pc bits 5 to 6 indicate the MPEG-H 3D Audio mode. The repetition periods of data-bursts in IEC 60958 frames shall be determined from the data-type-dependent information specified in Table 4 and Table 7.

5 Format of data-burst for MPEG-H 3D Audio

5.1 General

Clause 5 specifies the data-burst for MPEG-H 3D Audio. Specific properties such as reference points, repetition period, the method of filling stream gaps, and decoding latency are specified.

The decoding latency (or delay) should be taken into account by the transmitter to schedule data-bursts as necessary to establish synchronization between picture and decoded audio.

5.2 Pause data-bursts for MPEG-H 3D Audio

Pause data-bursts for MPEG-H 3D Audio are defined in Table 2.

Table 2 – Repetition period of pause data-bursts for MPEG-H 3D Audio

Data-type of audio data-burst	Repetition period of pause data-burst	
	Mandatory	Recommended
MPEG-H 3D Audio	–	3 IEC 60958 frames
MPEG-H 3D Audio HBR	–	4 IEC 60958 frames

If regular audio data-bursts are not being transmitted due to, for example, a pause condition, it is recommended to use pause data-bursts to fill such stream gaps. The repetition period of the pause data-bursts should be selected according to Table 2. If other repetition periods are necessary to precisely fill the stream gap length, or to meet the requirement on audio data-burst spacing (see IEC 61937-1), pause data-bursts may have other lengths.

When a stream gap in an audio stream is filled by a sequence of pause data-bursts, the Pa of the first pause data-burst shall occur after exactly that number of IEC 60958 frames as indicated by the MPEG-H 3D Audio data-frame length in conjunction with the data-type-dependent information from Table 4. It is recommended that the sequence of pause data-bursts that fills the stream gap should continue from this point until the Pa of the first audio data-burst that follows the stream gap, or as close as possible to that point, considering the specific IEC 60958 frame length of the pause data-burst with respect to the MPEG-H 3D Audio data frame length. The repetition-period-length parameter contained in the pause data-burst is intended to be interpreted by the receiver as an indication of the number of decoded PCM samples that are missing (due to the resulting audio gap).

5.3 Audio data-bursts

5.3.1 MPEG-H 3D Audio

An MPEG-H 3D Audio bit stream consists of a sequence of MPEG-H 3D Audio data frames. Each data-burst is headed with a preamble followed by payload and stuffing, as shown in Figure 1. The value of data-type bits 0 to 4 of an MPEG-H 3D Audio data-burst according to this document is 25 and the value of data-type bits 5 to 6 is 0.

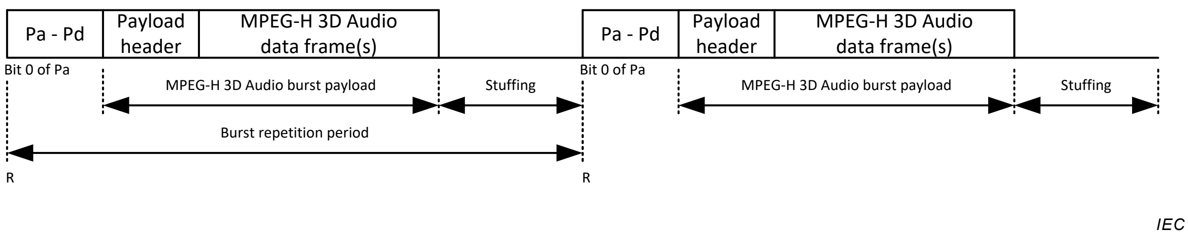

Figure 1 – MPEG-H 3D Audio data-burst structure