# INTERNATIONAL STANDARD

## ISO/IEC 23008-6

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

## Part 6:
## 3D audio reference software

*Technologies de l'information — Codage à haut rendement et fourniture de supports dans les environnements hétérogènes —*
*Partie 6: Logiciel de référence 3D Audio*

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# Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see http://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 23008-6:2018), which has been technically revised.

The main changes compared to the previous edition are as follows:

— integration of Production Metadata module into the 3D Audio framework;

— integration of Earcon Metadata module into the 3D Audio framework;

— integration of MHASPacketType PACTYP_LOUDNESS;

— corrected decoding of streams with numPreRollFrames equal to 0;

— corrected decoding of streams in contribution mode;

— corrected decoding of streams with respect to gVBAP, TNS, IGF;

— corrected encoding of streams with respect to AudioTruncationInfo and bit demand estimation;

— general maintenance and elimination of compiler warnings;

— reformatting of command line help of the encoder module.

A list of all parts in the ISO/IEC 23008 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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

## Part 6: 3D audio reference software

## 1 Scope

This document contains simulation software for the MPEG-H 3D audio standard as defined in ISO/IEC 23008-3.

## 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.

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

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

## 4 Reference software structure

### 4.1 General

This software has been derived from reference models used in the process of developing ISO/IEC 23008-3.

The implementation of this reference software is compliant with the MPEG-H 3D audio decoding processes described in ISO/IEC 23008-3. Complying ISO/IEC 23008-3 implementations are not expected to follow the algorithms or the programming techniques used by the reference software. This decoding software is considered compliant but cannot add anything to the textual technical description of ISO/IEC 23008-3.

The software contained in this document is divided into several categories:

a) **Bitstream decoding software** is catalogued in Clause 5. The bitstreams shall be encoded in accordance with ISO/IEC 23008-3. The software decodes the streams into the audio signals associated with each bitstream. Attention is drawn to the fact that several different implementations could produce the same result – but that the implementation of the software provided is compliant with the MPEG-H 3D audio decoding processes described in ISO/IEC 23008-3. The decoder software implementation is provided at http://standards.iso.org/iso-iec/23008/-6/ed-2/en.

b)  **Bitstream encoding software** is catalogued in <u>Annex A</u>. The software creates compressed bitstreams from associated audio signals. The techniques used for encoding are not specified by this document. The encoder software implementation is provided at <u>http://standards.iso.org/iso-iec/23008/-6/ed-2/en</u>.

c)  **Utility software** is catalogued in <u>Annex B</u>. This software was found useful by the developers of this document, but may not conform to the specifications given in ISO/IEC 23008-3.

The software as source code package can be found at <u>http://standards.iso.org/iso-iec/23008/-6/ed-2/en</u>.

## 4.2  Copyright disclaimer for software modules

Each source code module in this document contains copyright disclaimer, which shall not be removed from the source code module.

A generic disclaimer is provided below:

```
This software module was originally developed by


<CN>



in the course of development of the ISO/IEC 23008-3 for reference purposes and its performance
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```

NOTE      <CN> = Company name.

# 5  Bitstream decoding software

## 5.1  General

The provided bitstream decoding software is a normative reference implementation of the respective specification.

## 5.2  MPEG-H 3D audio decoding software

| Location | Content |
|---|---|
| modules/ | Reference software modules made use of by the reference software decoder, the reference software encoder, or both |
| modules/3DAudioCoder/3DAudioDecoder | MPEG-H 3D audio decoder |

# Annex A
## (informative)

# Bitstream encoding software

## A.1 General

The bitstream encoding software provided at http://standards.iso.org/iso-iec/23008/-6/ed-2/en may be used to create compressed bitstreams with the normative syntax as described in ISO/IEC 23008-3. The techniques used for encoding are not specified by this document.

Attention is called to the fact that neither quality nor complexity of the encoder implementation in the electronic attachment had been fully optimized.

The reference model encoder (RM) creates compressed bitstreams with the normative syntax as described in 23008-3. The performance of this encoder should not be taken as indicative of that which can be obtained from implementations where quality and computational optimization are given priority.

## A.2 MPEG-H 3D audio encoding software

| Location | Content |
|---|---|
| modules/ | Reference software modules made use of by the reference software decoder, the reference software encoder, or both |
| modules/3DAudioCoder/3DAudioEncoder | MPEG-H 3D audio encoder |

# Annex B
## (informative)

# Additional utility software

## B.1 General

Software that appears in this annex has proven to be useful to the developers of this document but is not a normative reference implementation.

## B.2 MPEG-H 3D audio utility software

The audio utility software is located in the "tools/" directory. It contains

— libraries and command line programs for manipulating WAV files, including support for manipulating complex valued QMF domain signals,

  — WAV file format reader/writer,

  — channel merger/splitter,

  — channel/object separator,

  — cutter for removing leading/trailing samples,

— implementations of filter banks,

  — QMF implementation (qmflib)

  — FFT implementation (fftlib)

— bitstream reader routines,

— bitstream writer routines,

— helpers for handling loudspeaker channel configurations and associated geometry information,

— C++ wrapper implementations encapsulating the AFsp library and the qmflib.

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