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AMENDMENT 2
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Information technology — MPEG audio technologies —

Part 3: Unified speech and audio coding

AMENDMENT 2: Reference software

Technologies de l'information — Technologies audio MPEG —
Partie 3: Discours unifié et codage audio

AMENDEMENT 2: Logiciel de référence

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Foreword

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The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This Amendment specifies reference software for ISO/IEC 23003-3:2012 MPEG-D Unified Speech and Audio Coding (USAC). The USAC reference software is made available as an electronic attachment to this Amendment.

Information technology — MPEG audio technologies —

Part 3:
Unified speech and audio coding

AMENDMENT 2: Reference software

Add a new Clause 9, "Reference software", as shown below:

9 Reference software

9.1 Reference software structure

9.1.1 Introduction

This clause contains simulation software for MPEG-D USAC as defined in this part of ISO/IEC 23003-3. This software has been derived from reference models used in the process of developing this part of ISO/IEC 23003-3.

Reference software is normative in the sense that it correctly implements the USAC decoding processes described in this part of ISO/IEC 23003-3. Complying ISO/IEC 23003-3 implementations are not expected to follow the algorithms or the programming techniques used by the reference software. Although the decoding software is considered normative, it cannot add anything to the textual technical description of USAC included in this part of ISO/IEC 23003-3.

The software contained in this Clause 9 and in Annex H is divided into several categories:

a) **Bitstream decoding software** is catalogued in 9.2. This software accepts bitstreams encoded according to the normative specification in this part of ISO/IEC 23003-3 and decodes the streams into the audio signals associated with each bitstream. While this software appears in the normative part of this specification, attention is drawn to the fact that the implementation techniques used in this software are not considered normative – several different implementations could produce the same result – but the software is considered normative in that it correctly implements the USAC decoding processes described in this part of ISO/IEC 23003-3.

b) **Bitstream encoding software** is catalogued in H.1 (informative). The software creates compressed bitstreams from associated audio signals. The techniques used for encoding are not specified by this part of ISO/IEC 23003-3. Two encoder software implementations are provided as an electronic attachment to this part of ISO/IEC 23003-3.

c) **Utility software** is catalogued in H.2 (informative). This software was found useful by the developers of this part of ISO/IEC 23003-3, but may not conform to the normative specifications given in ISO/IEC 23003-3.

9.1.2 Copyright disclaimer for software modules

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

The generic version of this disclaimer is provided below:

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This software module was originally developed *by <FN1> <LN1> (<CN1>) and edited by <FN2> <LN2> (<CN2>), <FN3> <LN3> (<CN3>),* in the course of development of the <standard> for reference purposes and its performance may not have been optimized. This software module is an implementation of one or more tools as specified by the <standard>.

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NOTE 1 In the text <standard> should be replaced with the appropriate International Standard, e.g. ISO/IEC 23003-3.

NOTE 2 <FN> = First Name, <LN> = Last name, <CN> = Company Name.

NOTE 3 Sentences in *italics* are not required in the statement if the original developer does not wish to be identified.

NOTE 4 Sentences in **bold** are not required in the statement if the original developer allows unrestricted use of this software.

NOTE 5 Sentences underlined should be removed when the <standard> is published.

NOTE 6 Reference to "ITU Recommendation" may be omitted when the module is deemed not to be relevant for ITU Recommendations.

9.2 Bitstream decoding software

9.2.1 Introduction

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

9.2.2 USAC decoding software

Location	Content
mpegD_usac\usacEncDec\	Unified Speech and Audio Decoder
mpegD_usac\mp4spatialdec\	MPEG Surround 2-1-2 Decoding Module

Add Annex H:

Annex H

(informative)

Reference software

H.1 Bitstream encoding software

H.1.1 Introduction

The bitstream encoding software provided as an electronic attachment to this part of ISO/IEC 23003-3 may be used to create compressed bitstreams with the normative syntax as described in ISO/IEC 23003-3. The techniques used for encoding are not specified by this part of ISO/IEC 23003-3.

Encoder implementations available as an electronic attachment to this part of ISO/IEC 23003-3 are listed below. Attention is called to the fact that neither quality nor complexity had been fully optimized.

— **Reference Model Encoder (RM)** creates compressed bitstreams with the normative syntax as described in 23003-3. 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.

— **Common Encoder (JAME)** creates compressed bitstreams with the normative syntax as described in 23003-3. The encoder software has been optimized to deliver its best quality at mono operating modes.

H.1.2 USAC encoding software

Location	Content
mpegD_usac\usacEncDec\	Unified Speech and Audio Encoder (RM)
mpegD_usac\mp4spatialenc\	MPEG Surround 2-1-2 Decoding Module
mpegD_usac\MPEG_Ref_Enc_Contrib\	Further alternative encoding modules
mpegD_usac\usacJameEnc	Unified Speech and Audio Encoder (JAME)

H.2 Additional utility software

H.2.1 Introduction

Software that appears in this Annex has proven to be useful to the developers of this part of ISO/IEC 23003-3 but is not a normative reference implementation.

H.2.2 USAC utility software

Location	Content
mpegD_usac\mp4lib\	MP4 File Format Reader and Writer

Add Annex I:

Annex I

(informative)

Providers of reference software

The following organizations have contributed to the reference software:

— Fraunhofer IIS

— VoiceAge Corporation

— Dolby Laboratories

— Philips

— Panasonic

— Samsung

— Sony

— NTT Docomo

— Huawei

— ETRI

— Yonsei University