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Part 3:
Unified speech and audio coding

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Partie 3: Codage unifié parole et audio

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Foreword

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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 23003-3:2012), which has been technically revised. It also incorporates ISO/IEC 23003-3:2012/Cor.1:2012, ISO/IEC 23003-3:2012/Cor.2:2013, ISO/IEC 23003-3:2012/Cor.3:2015, ISO/IEC 23003-3:2012/Cor.4:2015, ISO/IEC 23003-3:2012/Amd.1:2014, ISO/IEC 23003-3:2012/Amd.1:2014/Cor.1:2015, ISO/IEC 23003-3:2012/Amd.2:2015, ISO/IEC 23003-3:2012/Amd.2:2015/Cor.1:2015 and ISO/IEC 23003-3:2012/Amd.3:2016.

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Introduction

As mobile appliances become multi-functional, multiple devices converge into a single device. Typically, a wide variety of multimedia content is required to be played on or streamed to these mobile devices, including audio data that consists of a mix of speech and music.

This document specifies unified speech and audio coding (USAC), which allows for coding of speech, audio or any mixture of speech and audio with a consistent audio quality for all sound material over a wide range of bitrates. It supports single and multi-channel coding at high bitrates and provides perceptually transparent quality. At the same time, it enables very efficient coding at very low bitrates while retaining the full audio bandwidth.

Where previous audio codecs had specific strengths in coding either speech or audio content, USAC is able to encode all content equally well, regardless of the content type.

In order to achieve equally good quality for coding audio and speech, the developers of USAC employed the proven MDCT-based transform coding techniques known from MPEG-4 audio and combined them with specialized speech coder elements like ACELP. Parametric coding tools such as MPEG-4 spectral band replication (SBR) and MPEG-D MPEG surround were enhanced and tightly integrated into the codec. The result delivers highly efficient coding and operates down to the lowest bit rates.

The main focus of this codec are applications in the field of typical broadcast scenarios, multimedia download to mobile devices, user-generated content such as podcasts, digital radio, mobile TV, audio books, etc.

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Information technology — MPEG audio technologies —

Part 3:
Unified speech and audio coding

1 Scope

This document specifies a unified speech and audio codec which is capable of coding signals having an arbitrary mix of speech and audio content. The codec has a performance comparable to, or better than, the best known coding technology that might be tailored specifically to coding of either speech or general audio content. The codec supports single and multi-channel coding at high bitrates and provides perceptually transparent quality. At the same time, it enables very efficient coding at very low bitrates while retaining the full audio bandwidth.

This document incorporates several perceptually-based compression techniques developed in previous MPEG standards: perceptually shaped quantization noise, parametric coding of the upper spectrum region and parametric coding of the stereo sound stage. However, it combines these well-known perceptual techniques with a source coding technique: a model of sound production, specifically that of human speech.

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 14496-3:2019, *Information technology — Coding of audio-visual objects — Part 3: Audio*

ISO/IEC 14496-26:2010, *Information technology — Coding of audio-visual objects — Part 26: Audio conformance*

ISO/IEC 23003-1, *Information technology — MPEG audio technologies — Part 1: MPEG Surround*

ISO/IEC 23003-4, *Information technology — MPEG audio technologies — Part 4: Dynamic range control*