

Second edition  
2018-12

---

---

# Information technology — MPEG audio technologies —

## Part 2: Spatial Audio Object Coding (SAOC)

*Technologies de l'information — Technologies audio MPEG —  
Partie 2: Codage d'objet audio spatial (SAOC)*



Reference number  
ISO/IEC 23003-2:2018(E)

© ISO/IEC 2018



**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO/IEC 23003-2:2018". Click here to purchase the full version from the ANSI store.

## Contents

	Page
Foreword.....	v
Introduction.....	vi
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>1</b>
<b>4 Notations and abbreviated terms .....</b>	<b>3</b>
4.1 Notation .....	3
4.2 Operations .....	3
4.3 Constants.....	3
4.4 Variables .....	3
4.5 Abbreviated terms.....	6
<b>5 SAOC overview .....</b>	<b>7</b>
5.1 General.....	7
5.2 Basic structure of the SAOC transcoder/decoder .....	8
5.3 Tools and functionality .....	10
5.4 Delay and synchronization.....	11
5.5 SAOC Profiles and levels.....	17
<b>6 Syntax .....</b>	<b>20</b>
6.1 Payloads for SAOC.....	20
6.2 Definition .....	35
<b>7 SAOC processing .....</b>	<b>43</b>
7.1 Compressed data stream decoding and dequantization of SAOC data.....	43
7.2 Compressed data stream encoding and quantization of MPS data.....	46
7.3 Time/frequency transforms .....	47
7.4 Signals and parameters .....	47
7.5 SAOC transcoding/decoding modes for baseline and LD profiles .....	51
7.6 EAO processing for baseline and LD profiles.....	64
7.7 SAOC-DE profile decoding modes.....	73
7.8 DCU processing .....	75
7.9 Modification range control for SAOC-DE processing modes.....	79
7.10 MBO processing.....	80
7.11 MCU Combiner.....	81
7.12 Effects .....	83
7.13 Low power SAOC processing.....	86
7.14 Low delay SAOC processing.....	87
<b>8 Transport of SAOC side information .....</b>	<b>89</b>
8.1 Overview .....	89
8.2 Transport and signalling in an MPEG environment.....	89
8.3 Transport of SAOC data over PCM channels.....	93
<b>9 Transport of predefined rendering information .....</b>	<b>94</b>
9.1 General.....	94
9.2 Rendering information description file format.....	95
<b>10 Conformance testing.....</b>	<b>96</b>
10.1 General.....	96
10.2 Terms and definitions .....	96
10.3 SAOC conformance testing.....	96
10.4 Bitstreams.....	96

This is a preview of "ISO/IEC 23003-2:2018". [Click here to purchase the full version from the ANSI store.](#)

<b>10.5</b>	<b>SAOC decoder/transcoder .....</b>	<b>105</b>
<b>11</b>	<b>Reference software .....</b>	<b>119</b>
<b>11.1</b>	<b>Reference software structure.....</b>	<b>119</b>
<b>Annex A</b>	<b>(normative) Tables.....</b>	<b>121</b>
<b>Annex B</b>	<b>(normative) Low delay MPEG surround .....</b>	<b>150</b>
<b>Annex C</b>	<b>(informative) Effects processing.....</b>	<b>161</b>
<b>Annex D</b>	<b>(informative) Encoder.....</b>	<b>163</b>
<b>Annex E</b>	<b>(informative) Guidelines for rendering matrix specification .....</b>	<b>167</b>
<b>Annex F</b>	<b>(informative) MCU combiner .....</b>	<b>169</b>
<b>Annex G</b>	<b>(informative) Reference software .....</b>	<b>171</b>

This is a preview of "ISO/IEC 23003-2:2018". Click here to purchase the full version from the ANSI store.

## 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 ISO documents 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](http://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 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](http://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](http://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 23003-2:2010), which has been technically revised. It also incorporates the Amendments ISO/IEC 23003-2:2010/Amd 1:2015, ISO/IEC 23003-2:2010/Amd 2:2015, ISO/IEC 23003-2:2010/Amd 3:2015, ISO/IEC 23003-2:2010/Amd 4:2016 and ISO/IEC 23003-2:2010/Amd 5:2016 and the Technical Corrigenda ISO/IEC 23003-2:2010/Cor 1:2012 and ISO/IEC 23003-2:2010/Cor 2:2014.

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

- clarifications on SAOC-DE profile description;
- corrections to SAOC-DE profile specification;
- corrections to SAOC-DE profile;
- corrections to MPEG SAOC IS text;
- corrections to the low power mode.

A list of all parts in the ISO/IEC 23003 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](http://www.iso.org/members.html).

## Introduction

In the preferred modes of operating, the SAOC system, the transmitted signal can be either mono, stereo or 3-channel. The audio objects can be represented by a mono, stereo, or 3-channel signal or have the MPEG surround (MPS) multi-channel background object (MBO) format. The additional parametric data exhibits a significantly lower data rate than required for transmitting all objects individually, making the coding very efficient. At the same time, this ensures compatibility of the transmitted signal with legacy devices.

When a multi-channel rendering setup (e.g. a 5.1 loudspeaker setup) is required, the SAOC system acts as a transcoder, converting the additional parametric data to MPS parameters, and interfaces to the MPS decoder that acts as rendering device. For certain rendering setups (e.g. a binaural or plain stereo setup), the SAOC system behaves as a decoder, using its own rendering engine. Another key feature is that the SAOC parametric data from different streams can be merged at parameter level to allow for the combination of SAOC streams, similar to the functionality of a multi-point control unit (MCU).

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO and IEC take no position concerning the evidence, validity and scope of this patent right. The holder of this patent right has assured ISO and IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and IEC. Information may be obtained from:

Qualcomm Incorporated  
6455 Lusk Blvd  
US-San Diego, CA 92121-2779

Fraunhofer Institute for Integrated Circuits IIS  
Leonrodstrasse 68  
DE-80636 München

LG Electronics  
16 Woomyeon-Dong Seocho-Gu  
KR-Seoul 137-724

Koninklijke Philips Electronics N.V.  
High Tech Campus 44  
NL-5656 AE, Eindhoven

Electronics and Telecommunications Research Institute  
161 Gajeong-dong Yuseong-gu  
KR-Daejeon 305-350

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.