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## Information technology — MPEG audio technologies —

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

#### AMENDMENT 4: SAOC Conformance

iTeh Standards  
*Technologies de l'information — Technologies audio MPEG —*  
*Partie 2: Codage d'objet audio spatial (SAOC)*  
AMENDMENT 4: Conformité SAOC  
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[ISO/IEC 23003-2:2010/Amd.4:2016](#)

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# Information technology — MPEG audio technologies —

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

### AMENDMENT 4: SAOC Conformance

*Add Clause 10, Conformance testing:*

#### 10 Conformance testing

##### 10.1 Introduction

This clause specifies conformance criteria for both bitstreams and decoders compliant with the SAOC standard as defined in Clauses 1 to 9 and Annexes A to G. This is done to assist implementers and to ensure interoperability.

##### 10.2 Terms and definitions

The terms and definitions as stated in Clause 3 apply. Furthermore, the following terms and definitions will be used throughout this clause.

**bitstream** (https://standards.iec.ch/standard/23003-2-2010-14281) data encoded according to the SAOC standard

**conformance test bitstream** bitstream used for testing the conformance of an SAOC decoder.

##### 10.3 SAOC conformance testing

5.5 defines the SAOC profiles and levels. Some conformance criteria apply to SAOC in general, while others are specific to the specific SAOC profile and its levels. Conformance shall be tested for the level of the profile with which a given bitstream or decoder/transcoder claims to comply.

##### 10.4 Bitstreams

###### 10.4.1 Characteristics

The SAOC audio object type (AOT) can be used in combination with various AOTs.

###### 10.4.2 Test procedure

###### 10.4.2.1 Introduction

An SAOC bitstream shall have the syntax and semantics as specified in Clauses 1 to 9 and Annexes A to G. The present subclause defines the conformance criteria that shall be fulfilled by a compliant bitstream. These criteria are specified for the syntactic elements of the bitstream and for some parameters decoded from the SAOC bitstream payload.

## 10.4.2.2 Configuration header

### 10.4.2.2.1 SAOCSpecificConfig()/SAOCDESpecificConfig()

<b>bsVersion</b>	For restrictions, see 10.4.2.5.
<b>bsSamplingFrequencyIndex</b>	Shall be in the range 0x0..0xc or 0xf. For further restrictions, see 10.4.2.5.
<b>bsSamplingFrequency</b>	For restrictions, see 10.4.2.5.
<b>bsLowDelayMode</b>	For restrictions, see 10.4.2.5.
<b>bsFreqRes</b>	Shall not be encoded with a value of 0.
<b>bsFrameLength</b>	For restrictions, see 10.4.2.5.
<b>bsNumObjects</b>	For restrictions, see 10.4.2.5.
<b>bsNumFGOs</b>	For restrictions, see 10.4.2.5.
<b>bsRelatedTo[i][j]</b>	No restrictions apply.
<b>bsTransmitAbsNrg</b>	No restrictions apply.
<b>bsNumDmxChannels</b>	For restrictions, see 10.4.2.5.
<b>bsTttDualMode</b>	No restrictions apply.
<b>bsTttBandsLow</b>	Shall not be encoded with a value larger than the value of numBands as given by Table 33.
<b>bsPdgFlag</b>	No restrictions apply.
<b>bsOneIOC</b>	No restrictions apply.
<a href="https://standards.iteh.ai/catalog/standards/iso/75a57e85-74a3-4b2f-8dc7-83cbb15fa532/iso-iec-23003-2-2010-amd-4-2016">https://standards.iteh.ai/catalog/standards/iso/75a57e85-74a3-4b2f-8dc7-83cbb15fa532/iso-iec-23003-2-2010-amd-4-2016</a>	
<b>bsDcuFlag</b>	For restrictions, see 10.4.2.5.
<b>bsDcuMandatory</b>	No restrictions apply.
<b>bsDcuDynamic</b>	No restrictions apply.
<b>bsDcuMode</b>	No restrictions apply.
<b>bsDcuParam</b>	No restrictions apply.
<b>bsDeLimitFlag</b>	For restrictions, see 10.4.2.5
<b>bsDeLimitFgo</b>	No restrictions apply.
<b>bsDeLimitBgo</b>	No restrictions apply.

#### 10.4.2.2.2 SAOCExtensionConfigData()

<b>bsSaocExtType</b>	No restrictions apply. Note that in case of values indicated as “N/A” in Table 43, the parsing function SAOCExtensionConfigData( <b>bsSaocExtType</b> ) shall return the value 0, such that possibly present data is read as <b>bsFillBits</b> (i.e. skipped) and correct parsing of the bitstream can continue.
<b>bsSaocExtLen</b>	No restrictions apply.
<b>bsSaocExtLenAdd</b>	No restrictions apply.
<b>bsSaocExtLenAddAdd</b>	No restrictions apply.
<b>bsFillBits</b>	No restrictions apply.

#### 10.4.2.2.3 SAOCExtensionConfigData(0)

The syntactic element SAOCExtensionConfigData(0) shall not be present in case of Low Delay profile. This syntactic element shall not be present in case of Baseline and Dialogue Enhancement profiles of Level 1. Furthermore, this syntactic element shall not be present if the helper variable numSlots has a value that is not listed in ISO/IEC 23003-1:2007, Table 55. Furthermore, if this syntactic element is present, the bitstream shall fulfil the requirements outlined in ISO/IEC 23003-1:2007, 6.1.13. For further restrictions, see 10.4.2.5.

**bsDeLimitFgoEAO** No restrictions apply.

**bsDeLimitBgoEAO** No restrictions apply.

**bsDcuFlag2** No restrictions apply.

**bsDcuMode2** No restrictions apply.

**bsDcuParam2** No restrictions apply.

<https://standards.iteh.ai> ISO/IEC 23003-2:2010/Amd 4:2016

**10.4.2.2.3.1 ResidualConfig()** <https://standards.iteh.ai/standard/iso-iec-23003-2-2010-amd-4-2016/section-10-4-2-2-3-1-residualconfig/>

**bsResidualSamplingFrequencyIndex** Shall fulfil the requirements outlined in ISO/IEC 23003-1:2007, 6.1.13 and Table 88.

**bsResidualFramesPerSAOCFrame** Shall fulfil the requirements outlined in ISO/IEC 23003-1:2007, 6.1.13 and Table 87

**bsNumGroupsFGO** For restrictions, see 10.4.2.5.

**bsResidualPresent[i]** No restrictions apply.

**bsResidualBands[i]** Shall not be encoded with a value larger than the value of **bsTtnBandsLow[i]**.

**bsTtnDualMode[i]** No restrictions apply.

**bsTtnBandsLow[i]** Shall not be encoded with a value larger than the value of numBands as given by Table 33.

#### 10.4.2.2.4 SAOCExtensionConfigData(1)

No restrictions apply.

**10.4.2.2.5 SAOCExtensionConfigData(2)**

The syntactic element SAOCExtensionConfigData(2) shall not be present in case of SAOC-DE profile. Shall fulfil the requirements outlined in Table 51.

**10.4.2.2.6 SAOCExtensionConfigData(3)**

No restrictions apply.

**10.4.2.2.7 SAOCExtensionConfigData(8)****10.4.2.2.7.1 ObjectMetaData()**

**bsNumByteMetaData[i]** No restrictions apply.

**bsMetaData[i][j]** Shall be encoded in UTF-8 encoding format.

**10.4.2.2.8 SAOCExtensionConfigData(9)****10.4.2.2.8.1 PresetConfig()**

**bsNumPresets** No restrictions apply.

**bsNumBytePresetLabel[i]** No restrictions apply.

**bsPresetLabel[i][j]** Shall be encoded in UTF-8 encoding format.

**bsPresetMatrix** No restrictions apply.

**10.4.2.2.8.2 PresetMatrixData()**

**bsPresetMatrixType** Shall not be encoded with a value of 3.

**bsPresetMatrixElements[i][j]** No restrictions apply.

<https://standards.iteh.ai/catalog/standards/iso/75a57e85-74a3-4b2f-8dc7-83cbb15fa532/iso-iec-23003-2-2010-amd-4-2016>

**10.4.2.2.8.3 PresetMatrixData()**

**bsPresetUserDataIdentifier[i]** Shall be encoded in UTF-8 encoding format.

**bsPresetUserDataLen** No restrictions apply.

**10.4.2.2.9 SAOCExtensionConfigData(10)**

The syntactic element SAOCExtensionConfigData(10) shall not be present in case of SAOC-DE profile.

**10.4.2.2.9.1 SeparationMetaData()**

**bsNumSeparationPairs** No restrictions apply.

**bsSeparationMainObjectID[i]** No restrictions apply.

**bsSeparationSubObjectID[i]** No restrictions apply.

**10.4.2.3 Bitstream payload****10.4.2.3.1 SAOCFrame()/SAOCDFrame()**

**bsIndependencyFlag** No restrictions apply.

#### 10.4.2.3.1.1 SAOCFramingInfo()

**bsFramingType** No restrictions apply.

**bsNumParamSets** For restrictions, see 10.4.2.5.

**bsParamSlot[i]** Shall be in the range 0...**bsFrameLength**.

#### 10.4.2.3.1.2 EcDataSaoc()

**bsXXXdataMode[i][j]** Shall fulfil the requirements outlined in ISO/IEC 23003-1:2007, 6.1.13. Shall not be encoded with the value 2 if EAO mode (residual coding) is applied.

**bsDataPairXXX[i][j]** Shall have the value 0 if setIdx == dataSets-1. No further restrictions apply.

**bsQuantCoarseXXX[i][j]** No restrictions apply.

**bsFreqResStrideXXX[i][j]** No restrictions apply.

#### 10.4.2.3.1.3 SAOCecDataPair()

**bsPcmCodingXXX[i][j]** No restrictions apply.

#### 10.4.2.3.1.4 SAOCdiffHuffData()

**bsDiffType** No restrictions apply.

**bsCodingScheme** No restrictions apply.

#### 10.4.2.3.1.5 SAOCHuffData1D()

hcodFirstBand\_XXX **bsCodeW** shall have a value out of a set of values as defined by column “code-word” of Tables A.2 and A.3, respectively, and shall have a length as defined by the corresponding entry in column “length”.

hcod1D\_XXX\_YY **bsCodeW** shall have a value out of a set of values as defined by column “code-word” of Tables A.4 and A.5, respectively, and shall have a length as defined by the corresponding entry in column ‘length’.

**bsSign** No restrictions apply.

### 10.4.2.3.1.6 SAOCHuffData2DFreqPair()

hcodLavIdx	<b>bsCodeW</b> shall have a value out of a set of values as defined by column “code-word” of Table A.24, and shall have a length as defined by the corresponding entry in column “length”.
hcodFirstBand_XXX	<b>bsCodeW</b> shall have a value out of a set of values as defined by column “code-word” of Tables A.2 and A.3, respectively, and shall have a length as defined by the corresponding entry in column “length”.
hcod2D_XXX_YY_FP_LL	<b>bsCodeW</b> shall have a value out of a set of values as defined by column “code-word” of the applicable table out of Tables A.11 to A.22, and shall have a length as defined by the corresponding entry in column “length”.
hcod1D_XXX_YY	<b>bsCodeW</b> shall have a value out of a set of values as defined by column “code-word” of Tables A.4 and A.5, respectively, and shall have a length as defined by the corresponding entry in column “length”.
<b>bsSign</b>	No restrictions apply.

### 10.4.2.3.2 SAOCExtensionFrame()

No restrictions apply. Note that in case of **bsSaocExtType** having values indicated as “N/A” in Table 43, the parsing function SAOCExtensionFrameData(**bsSaocExtType**) shall return the value 0, such that possibly present data is read as **bsFillBits** (i.e. skipped) and correct parsing of the bitstream can continue.

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<b>bsSaocExtLen</b>	No restrictions apply.
<b>bsSaocExtLenAdd</b>	No restrictions apply.
<b>bsFillBits</b>	No restrictions apply.

<https://standards.iteh.ai/catalog/standards/iso/75a57e85-74a3-4b2f-8dc7-83ccb15fa532/iso-iec-23003-2-2010-amd-4-2016>

### 10.4.2.3.3 SAOCExtensionFrameData(0)

<b>bsDeLimitEaoUpdate</b>	No restrictions apply.
<b>bsDeLimitFgoEAO</b>	No restrictions apply.
<b>bsDeLimitBgoEAO</b>	No restrictions apply.
<b>bsDcuDynamicUpdate2</b>	No restrictions apply.
<b>bsDcuMode2</b>	No restrictions apply.
<b>bsDcuParam2</b>	No restrictions apply.

### 10.4.2.4 Transport of SAOC data

#### 10.4.2.4.1 Transport in an MPEG environment

##### 10.4.2.4.1.1 Introduction

In case of transport of SAOC data in an MPEG-4 environment, the following restrictions apply. In case of SAOCspecificConfig() (or SAOCDEspecificConfig() for SAOC-DE profile) is conveyed out-of-band, any in-band SAOCspecificConfig() (or SAOCDEspecificConfig() for SAOC-DE profile) shall be identical to the out-of-band one.

In case of embedding of MPEG SAOC data in MPEG-2/4 AAC payloads, the following restrictions apply. There must be at least one extension\_payload() element with extension\_type==EXT\_SAOC\_DATA (or extension\_type==EXT\_SAOC\_DE\_DATA for SAOC-DE profile) in each AAC frame in order to enable immediate implicit signalling.

In case of embedding of MPEG SAOC data in MPEG-1/2 Layer I/II/III bitstreams, the following restrictions apply. The first bit of the ancSyncword must be byte-aligned with respect to the first bit of the 0xFFFF syncword of the MPEG-1/2 frame header. The AncDataElement() must be completely included in the ancillary data of a single MPEG-1/2 frame. There must be at least one AncDataElement() in the ancillary data of each MPEG-1/2 frame in order to enable immediate implicit signalling.

#### 10.4.2.4.1.2 AncDataElement()

<b>ancSyncword</b>	Shall be 0x473.
<b>ancType</b>	No restrictions apply.
<b>ancStart</b>	No restrictions apply.
<b>ancStop</b>	No restrictions apply.
<b>ancLenBytes</b>	No restrictions apply.
<b>ancLenBytesAdd</b>	No restrictions apply.
<b>ancCrcWord</b>	Shall have the value as determined by the procedure specified in 8.2.4.
<b>ancDataSegmentByte</b>	A data block formed by concatenation of ancDataSegmentByte as specified in 8.2.4 shall, if ancType==0x0 or ancType==0x1, constitute one SaocDataFrame() syntax element, padded at the end to obtain an integer number of bytes.

#### 10.4.2.4.1.3 SaocDataFrame(saocHeaderFlag)

<b>saocHeaderFlag</b>	No restrictions apply.
<b>saocHeaderLen</b>	No restrictions apply.
<b>saocHeaderLenAdd</b>	No restrictions apply.
<b>bsFillBits</b>	No restrictions apply.
<b>saocTimeAlignFlag</b>	No restrictions apply.
<b>saocTimeAlign</b>	Shall have an absolute value no larger than two times the number of samples in the MPEG SAOC PCM frame as defined by <b>bsFrameLength</b> and <b>bsSamplingFrequencyIndex</b> or <b>bsSamplingFrequency</b> .

#### 10.4.2.4.2 Transport over PCM channels

##### 10.4.2.4.2.1 Introduction

In case of transport of SAOC data over PCM channels, the following restrictions apply. The BuriedData() data shall be embedded in the LSBs of the PCM channels. Typically, 16 bit PCM samples are used. However, also other sample precisions shall be supported, e.g. 20 and 24 bits.