

INTERNATIONAL STANDARD



**Digital audio – Interface for non-linear PCM encoded audio bitstreams applying
IEC 60958 –
Part 11: MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM
ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –****Part 11: MPEG-4 AAC and its extensions
and MPEG-D USAC in LATM/LOAS**

FOREWORD

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IEC 61937-11 has been prepared by technical area 20: Analogue and digital audio, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2010, and Amendment 1:2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) MPEG-D USAC has been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3523/CDV	100/3582/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

A list of all parts in the IEC 61937 series, published under the general title *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958*, can be found on the IEC website.

(<https://standards.iteh.ai>)

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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INTRODUCTION

Modern digital video broadcasting standards, such as DVB, include support for the MPEG-4 HE AAC and/or HE AAC v2 audio codecs specified in ISO/IEC 14496-3. An increasing number of countries are adopting these new codecs for their standard-definition and high-definition digital video broadcasting services and have started with implementations.

For MPEG-2 AAC audio (ISO/IEC 13818-7), the specified framing format for the audio bit stream is ADTS and its transport over an IEC 60958 interface is specified in IEC 61937-6.

However, the MPEG-4 (ISO/IEC 14496-3) and MPEG-D (ISO/IEC 23003-3) audio codecs introduce new features and capabilities that require a framing format that supports more flexible signalling and delivery mechanisms. Therefore, MPEG-2 systems (ISO/IEC 13818-1) specify the MPEG-4 LATM/LOAS framing format for MPEG-4 audio codecs to overcome the limitations of ADTS.

In order to be able to pass the MPEG-4 or MPEG-D audio bit stream from a set-top box to an A/V receiver connected via the IEC 60958 interface without needing to reframe the audio bit stream within ADTS, the MPEG-4 LATM/LOAS framing format needs to be supported by IEC 61937, including the high-speed transmission protocol where the interface does not carry an embedded sampling frequency clock.

INTRODUCTION to Amendment 1

~~The revision of IEC 61937-11:2010 has become necessary to specify the protocol where the interface does not carry an embedded sampling frequency clock. The purpose is primarily to support stereophonic multichannel audio applications increasing their channel counts. It is justified in that ARIB introduces 22.2/7.1 audio channel applications, as given in ITU-R BS.2051-0, into the market in 2018. This Amendment 1 contains the following significant technical changes with respect to IEC 61937-11:2010:~~

- ~~• new Annex B specifies new high speed transmission;~~
- ~~• the term "Sub data type" is discontinued.~~

DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –

Part 11: MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS

1 Scope

This part of IEC 61937 describes the method to convey non-linear PCM bitstreams encoded in accordance with the MPEG-4 AAC format and its extensions (spectral band replication, parametric stereo and MPEG surround), and non-linear PCM bitstreams encoded in accordance with the MPEG-D USAC format, framed in MPEG-4 LATM/LOAS.

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.

~~IEC 60958 (all parts), Digital audio interface~~

IEC 60958-3:2021, *Digital audio interface – Part 3: Consumer applications*

IEC 61937-1:2021, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 1: General*

IEC 61937-11:2021

~~IEC 61937-2:2021, Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 2: Burst-info~~

ISO/IEC 14496-3:2009/2019, *Information technology – Coding of audio-visual objects – Part 3: Audio*

ISO/IEC 23003-3:2020, *Information technology – MPEG audio technologies – Part 3: Unified speech and audio coding*

3 Terms and definitions

For the purposes of this document, the terms, definitions and abbreviated terms of IEC 61937-1 and IEC 61937-2, and the following apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

access unit

smallest entity to which timing information can be attributed

Note 1 to entry: An access unit is the smallest individually decodable unit.

Note 2 to entry: A decoder consumes access units.

3.1.2

AudioMuxElement(1)

LATM element that carries payload data for at least one audio elementary stream, related payload length information, and multiplex configuration information

Note 1 to entry: This element carries payload data in form of PayloadMux elements. ~~The number in brackets indicates multiplexing configuration (StreamMuxConfig) is multiplexed into AudioMuxElements, that is in-band transmission.~~ If the term is followed by a number in parentheses, a "1" indicates that the multiplexing configuration (StreamMuxConfig) is multiplexed into the AudioMuxElement, i.e. the multiplexing configuration (StreamMuxConfig) is transmitted "in-band". A "0" indicates that the multiplexing configuration (StreamMuxConfig) is not present in the AudioMuxElement and needs to be transmitted by other means ("out-of-band").

3.1.3

AudioSpecificConfig

configuration structure used to convey parameters to initialize the MPEG-4 audio decoder

3.1.4

LATM

low overhead MPEG-4 audio transport multiplex

multiplexing layer defined by ISO/IEC 14496-3 used for multiplexing of audio elementary streams

3.1.5

LOAS

low overhead audio stream

synchronisation layer defined by ISO/IEC 14496-3

Note 1 to entry: Three different formats of LOAS are defined, each of which is designed to address the specific characteristics of the underlying transmission layer.

3.1.6

MPEG-4 AAC profile

contains only the MPEG-4 AAC low complexity audio object type

Note 1 to entry: The MPEG-4 AAC low complexity object type is the counterpart to the MPEG-2 AAC low complexity profile. In addition to the MPEG-2 AAC LC profile, the MPEG-4 AAC low complexity object type enables the usage of the PNS tool.

Note 2 to entry: The MPEG-4 AAC low complexity object type is used when there are restrictions on the usage of RAM and processing complexity.

3.1.7

MPEG-4 high-efficiency AAC profile

contains the spectral band replication object type in conjunction with the MPEG-4 AAC low complexity object type

Note 1 to entry: For further information, see ISO/IEC 14496-3. The MPEG-4 high-efficiency AAC profile is a superset of the MPEG-4 AAC profile.

3.1.8

MPEG-4 high-efficiency AAC profile version 2

contains the parametric stereo object type and the spectral band replication object type in conjunction with the AAC low complexity object type

Note 1 to entry: The MPEG-4 high-efficiency AAC profile version 2 is a superset of the MPEG-4 high-efficiency AAC profile.

3.1.9

MPEG-D Baseline USAC profile

profile that contains the Unified Speech and Audio Coding object type

3.1.10**MPEG-D extended high-efficiency AAC profile**

profile that contains the parametric stereo object type and the spectral band replication object type in conjunction with the AAC low complexity object type, as well as the USAC object type

Note 1 to entry: The MPEG-D extended high-efficiency AAC profile is a superset of the MPEG-4 high-efficiency AAC profile version 2 and the MPEG-D Baseline USAC profile.

3.1.11**MPEG surround**

technology used for coding of multichannel signals based on a downmixed signal of the original multichannel signal, and associated spatial parameters

Note 1 to entry: MPEG surround is defined in ISO/IEC 23003-1.

3.1.12**PayloadMux**

payload data chunk in an AudioMuxElement that contains potentially multiplexed payload data for multiple audio elementary streams

Note 1 to entry: In general, PayloadMux elements can be concatenated inside AudioMuxElements.

3.1.13**SpatialSpecificConfig**

configuration structure used to initialize the MPEG surround decoder

3.1.14**StreamMuxConfig**

configuration structure that describes the structure of the LATM payload multiplex

3.1.15**MDCT****modified discrete cosine transformation**

transformation schema used by AAC <https://standards.iteh.ai/catalog/standards/iec/50ac4c22-153b-4ef8-84e5-b20760370da9/iec-61937-11-2021>

<https://standards.iteh.ai/catalog/standards/iec/50ac4c22-153b-4ef8-84e5-b20760370da9/iec-61937-11-2021>

3.1.16**transformation length** ~~(of the AAC codec or core codec)~~

~~AAC can operate in two modes using either a 960 lines or 1 024 lines MDCT transformation for long blocks~~ number of audio samples or corresponding MDCT lines that are processed as a block per each audio frame

Note 1 to entry: An MDCT line is a spectral component described by frequency, amplitude and phase.

3.1.17**USAC frame length**

number of PCM audio samples per USAC frame

Note 1 to entry: USAC can operate in several modes using 1 024, 2 048, 4 096 or 768 linear PCM samples per USAC frame.

3.2 Abbreviated terms

AAC	Advanced Audio Coding
AAC LC	MPEG-4 AAC Low Complexity
HE AAC	MPEG-4 High-Efficiency AAC and MPEG-4 High-Efficiency AAC Version 2
ADTS	Audio Data Transport Stream
DVB	Digital Video Broadcasting
MDCT	modified discrete cosine transformation
MPEG	Moving Picture Experts Group

MPS	MPEG Surround
PNS	Perceptual Noise Substitution
PS	parametric stereo
SBR	spectral band replication
USAC	Unified Speech and Audio Coding
LT LT	AAC transformation length

4 Mapping of the audio bit stream on to IEC 61937-1

4.1 General

The coding of the bit stream and data-burst is in accordance with IEC 61937-1 and IEC 61937-2.

4.2 Burst-info for MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS

The 16-bit burst-info contains information about the data found in the data-burst (see Table 1).

Table 1 – Values for data-type bits 0-4 and data-type bits 5-6

Data-type bits 0-4 according to IEC 61937-2 Value of Pc bits 0-4	Data-type bits 5-6 Value of Pc bits 5-6	Contents	Reference point R	Repetition period of data-bursts in IEC 60958 frames
0-22	0-3	According to IEC 61937		
23	0	According to IEC 61937-10		Definition specific to IEC 61937-10
	1	AAC LC	Bit 0 of Pa	960 / 1 024
	2	HE AAC	Bit 0 of Pa	1 920 / 2 048
	3	Reserved for future definition of other applications According to IEC 61937	reserved	Reserved for future definition of other applications
24-34	0-3	According to IEC 61937		
24	0-3	According to IEC 61937		
25	0-2	According to IEC 61937		
	3	USAC	Bit 0 of Pa	768 / 1 024 / 2 048 / 4 096
26-31	0-3	According to IEC 61937		

Bits 0-4 of the burst-info (Pc) signal the data-type bits 0-4 used for transmission. For MPEG-4 AAC-based audio in LATM/LOAS, the signalled data-type bits 0-4 is 23 (for AAC LC and HE AAC) or 25 (for USAC). Annex C gives a brief overview of MPEG-4 AAC, its extensions, and MPEG-D USAC.

If the Pc bits 0-4 are equal to 23, the Pc bits 5-6 indicate if the transmitted data stream contains audio encoded in AAC LC or HE AAC (including high-efficiency AAC version 2). Only values 1 and 2 refer to the transmission of AAC LC or HE AAC based audio. The values 0 and 3 are used for indication of codec types which are described by other or future parts of IEC 61937.

If the Pc bits 0-4 are equal to 25, the Pc bits 5-6 indicate if the transmitted data stream contains audio encoded in USAC. Only value 3 refer to the transmission of USAC based audio. The values 0, 1 and 2 are used for indication of codec types which are described by other or future parts of IEC 61937.