

# INTERNATIONAL STANDARD

**Digital audio – interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 10: Non-linear PCM bitstreams according to the MPEG-4 audio lossless coding (ALS) format**

[IEC 61937-10:2017](#)

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED  
AUDIO BITSTREAMS APPLYING IEC 60958 –****Part 10: Non-linear PCM bitstreams according to the MPEG-4 audio  
lossless coding (ALS) format**

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International Standard IEC 61937-10 has been prepared by technical area 4: Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

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

- a) Addition of Levels 2, 3, 4 of MPEG-4 ALS Simple Profile;
- b) Addition of data-type bits 0-4 and data-type bits 5-6 for MPEG-4 ALS with LATM/LOAS header.

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

CDV	Report on voting
100/2630/CDV	100/2930/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the 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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

## Part 10: Non-linear PCM bitstreams according to the MPEG-4 audio lossless coding (ALS) format

### 1 Scope

This part of IEC 61937 specifies the method for IEC 60958 to convey non-linear PCM bitstreams encoded in accordance with the MPEG-4 audio lossless coding (ALS) format.

### 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 60958-1, *Digital audio interface – Part 1: General*

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

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

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

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

ISO/IEC 14496-3:2009/AMD2:2010, *ALS simple profile and transport of SAOC*

ISO/IEC 14496-3:2009/AMD5:2015, *Support for Dynamic Range Control, New Levels for ALS Simple Profile, and Audio Synchronization*

### 3 Terms, definitions, abbreviated terms and conventions

#### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions 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>

##### 3.1.1

##### **als\_id**

ALS identifier in ALSSpecificConfig

### 3.1.2

#### **ALS Simple Profile**

MPEG-4 ALS Simple Profile defined by ISO/IEC 14496-3:2009/AMD2:2010 and ISO/IEC 14496-3:2009/AMD5:2015

### 3.1.3

#### **aux\_data**

auxiliary data contained in the MPEG-4 ALS burst payload

Note 1 to entry: Not required for decoding audio samples.

### 3.1.4

#### **aux\_size**

size of the auxiliary data field in bytes for MPEG-4 ALS

### 3.1.5

#### **channels**

number of channels-1, 'channels', contained in the MPEG-4 ALS burst payload

### 3.1.6

#### **latency**

delay time of an external audio decoder to decode a MPEG-4 ALS data-burst, defined as the sum of the receiving delay time and the decoding delay time

### 3.1.7

#### **length code**

code indicating the length of the data-burst-payload in 8-byte units according to this standard

### 3.1.8

#### **low overhead audio stream**

#### **LOAS**

synchronisation layer defined by ISO/IEC 14496-3

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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. AudioSyncStream shall be used.

### 3.1.9

#### **low-overhead MPEG-4 audio transport multiplex**

#### **LATM**

multiplexing layer defined by ISO/IEC 14496-3

Note 1 to entry: LATM is used for multiplexing of audio elementary streams. AudioMuxElement shall be used.

### 3.1.10

#### **resolution**

bit depth of the audio samples contained in the MPEG-4 ALS burst payload

### 3.1.11

#### **samples**

number of audio samples per channel contained in the MPEG-4 ALS burst payload

Note 1 to entry: In contrast to the ALS specification, each data-burst provides its own ALSSpecificConfig. Thus the 'samples' value refers to the total number of samples (per channel) of that data-burst.

### 3.1.12

#### **samp\_freq**

sampling frequency of the audio samples contained in the MPEG-4 ALS burst payload



### 3.2 Abbreviated terms

ALS	audio lossless coding
PCM	pulse-code modulation

### 3.3 Presentation convention

$01_2$	Value "01" in binary format
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## 4 Mapping of the audio bitstream onto IEC 61937

### 4.1 General

The coding of the bitstream and data-burst is in accordance with the IEC 61937 series of standards.

### 4.2 MPEG-4 ALS burst-info

The 16-bit burst-info contains information about the data that will be found in the data-burst in accordance with Table 1.

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**Table 1 – Fields of burst-info**  
**(data-type bits 0-4=23, data-type bits 5-6=0/ data-type bits 0-4=25, data-type bits 5-6=2)**

Bits of Pc	Value	Contents	Reference point R	Repetition period of data-burst in IEC 60958 frames
0 to 4		data-type bits 0-4		
	0-22	In accordance with IEC 61937-2		
	23	MPEG-4 ALS or other applications according to IEC 61937-2, depending on data-type bits 5-6	Bit 0 of Pa	See 5.2.1
	24-24	In accordance with IEC 61937-2		
	25	MPEG-4 ALS or other applications according to IEC 61937-2, depending on data-type bits 5-6	Bit 0 of Pa	See 5.2.1
	26-31	In accordance with IEC 61937-2		
5, 6		data-type bits 5-6 for data-type bits 0-4 23		
	0	MPEG-4 ALS		See 5.2.1
	1-3	In accordance with IEC 61937-2		
		data-type bits 5-6 for data-type bits 0-4 25		
	0-1	In accordance with IEC 61937-2		See 5.2.1
	2	MPEG-4 ALS in LATM/LOAS		
7	0	Error-flag indicating a valid burst-payload		
	1	Burst may contain errors		
8 to 12		Data-type bits 0-4 and data-type bits 5-6 dependent information for MPEG-4 ALS		
8, 9		Multiplier		
	0	[IEC 60958 frame rate] = audio sampling frequency × 2		
	1	[IEC 60958 frame rate] = audio sampling frequency × 4		
	2	[IEC 60958 frame rate] = audio sampling frequency × 8		
	3	Reserved for future Multiplier		
10 to 12	0	No indication		
	1	ALS Simple Profile Level 1		
	2	ALS Simple Profile Level 2		
	3	ALS Simple Profile Level 3		
	4	ALS Simple Profile Level 4		
	5-7	Reserved for future Profile or Level		
13 to 15		In accordance with IEC 61937-1 and IEC 61937-2.		

## 5 Format of MPEG-4 ALS data-bursts

### 5.1 General

This clause specifies the audio data-burst MPEG-4 ALS. Specific properties, such as reference points, repetition period, the method of filling stream gaps, and decoding latency, are specified for each data-type bits 0-4.

The decoding latency (or delay), indicated for the data-type bits 0-4, should be used by the transmitter to schedule data-bursts, as necessary, to establish synchronisation between video and decoded audio.

MPEG-4 ALS has the Simple Profile in order to restrict the computational complexity. The several compression tools of ALS are prohibited to use under the Simple Profile of ALS. In addition, maximum values of number of channels, sampling frequency, word length, number of samples per frame, prediction order, block-switching stages, and multi-channel coding stages are limited by defined Levels. For the other levels and profiles or any other cases with no profile indication, Annex C provides some recommendations.

## 5.2 Audio data-bursts

### 5.2.1 Data-burst for MPEG-4 ALS

Figure 1 shows the detailed description of the MPEG-4 ALS data-burst. The stream of the data-bursts for MPEG-4 ALS consists of sequences of MPEG-4 ALS bitstreams. The data-type bits 0-4 of a MPEG-4 ALS data-burst is 23. The data-type bits 5-6 is 0. The data-burst is headed with a burst-preamble, followed by the burst-payload, and stuffed with stuffing bits. The burst-payload of each data-burst of MPEG-4 ALS data shall contain an ALSSpecificConfig header, and one or more ALS random access units. Each data-burst constitutes a self-contained ALS bitstream, whose number of samples (per channel) is given in the field 'samples' of (the corresponding) ALSSpecificConfig. The units of length-code (burst\_length) shall be in 8-bytes. Note that if the actual data size of the data-burst is not a multiple of 8 bytes, 1 to 7 stuffing bytes are included in the burst length. Some examples of the relationship between IEC 60958 frame rate and frame repetition of MPEG-4 ALS data-burst are shown in Annex A.

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The number of samples for each encoded channel contained in the data-burst are indicated in the encoded ALS bitstream. The length of the MPEG-4 ALS data-burst depends on the encoded bit rate (which determines the MPEG-4 ALS frame length). For details, see Annex B.

The reference to the specification for the MPEG-4 ALS bitstream, representing the number of samples of encoded audio per frame, may be found in ISO/IEC 14496-3, subpart 11.

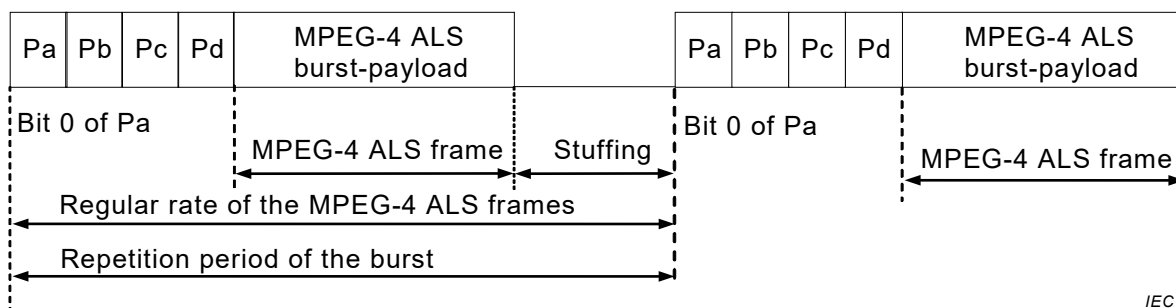


Figure 1 – MPEG-4 ALS data-burst

The regular rate of the MPEG-4 ALS frames and the repetition period of the data burst can be calculated as

'[samples] × [IEC 60958 frame rate]/[sampling frequency of the encoded audio samples (samp\_freq)]'.

The value of the 'samples' field is stored in the 9th to 12th bytes of the MPEG-4 ALS burst-payload. The value represents the number of samples contained in the MPEG-4 ALS burst-payload. The IEC 60958 frame rate is defined by the audio sampling frequency and a value of the multiplier (see Table 2).