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INTERNATIONAL STANDARD

Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 –
Part 9: Non-linear PCM bitstreams according to the MAT format

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International Standard IEC 61937-9 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 2007. This edition constitutes a technical revision.

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

a) addition of new frame rates.

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

CDV	Report on voting
100/2721/CDV	100/2933/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 parts in the IEC 61973 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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

Part 9: Non-linear PCM bitstreams according to the MAT format

1 Scope

This part of IEC 61937 describes the method to convey non-linear PCM bitstreams encoded according to the MAT 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 (all parts), *Digital audio interface*

IEC 61937-1:2007, *Digital audio interface for non-linear PCM encoded audio bit streams applying IEC 60958 – Part 1: General*

IEC 61937-1:2007/AMD1:2011, *Digital audio interface for non-linear PCM encoded audio bit streams applying IEC 60958 – Part 1: General*

IEC 61937-2, *Digital audio interface for non-linear PCM encoded audio bit streams applying IEC 60958 – Part 2: Burst-info*

3 Terms, definitions and abbreviated terms

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
audio frame rate
number of MAT audio frames per second

3.2
fractional frame rates
fractional audio frame rates supported by MAT

Note 1 to entry: These frame rates are written in shorthand notation, as specified in Table 1.

Table 1 – Shorthand notation for fractional frame rates

Fractional MAT audio frame rate (fps)	Shorthand version
$48 \times {}^{1\,000}/_{1\,001}$	47,952
$60 \times {}^{1\,000}/_{1\,001}$	59,94
$120 \times {}^{1\,000}/_{1\,001}$	119,88

3.3
latency
delay time of an external audio decoder to decode a MAT data-burst, defined as the sum of two values: the receiving delay time and the decoding delay time

3.4 Abbreviated terms

MAT Metadata-enhanced Audio Transmission

fps frames per second

4 Mapping of the audio bitstream on to IEC 61937-1

4.1 General

The coding of the bitstream and data-burst is in accordance with IEC 61937-1, IEC 61937-1:2007/AMD1:2011 and IEC 61937-2, including field names such as "Pc", "Pa" and "R".

4.2 MAT burst-info

The 16-bit burst-info contains information about the data that will be found in the data-burst (see Table 2).

Table 2 – Fields of burst-info

Bits of Pc	Data-type bits 0-4	Data-type bits 5-6	Contents	Reference point R	Repetition period of data-burst in IEC 60958 frames
0 – 6	1 – 21	According to IEC 61937			
	22	0	MAT	R-MAT	See Table 4
		1 – 3	According to IEC 61937		
	23 – 31	According to IEC 61937			
7 – 15	According to IEC 61937				

5 Format of MAT data-bursts

5.1 General

This clause specifies the audio data-burst MAT. Specific properties such as reference points, repetition period, the method of filling stream gaps, and decoding latency are specified.

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 synchronization between the picture and the decoded audio.

5.2 Pause data-burst

Pause data-burst for MAT is given in Table 3.

Table 3 – Repetition period of the pause data-bursts

Data-type bits 0-4 of audio data-burst	Repetition period of pause data-burst	
	Mandatory	Recommended
MAT	-	4 IEC 60958 frames

5.3 Audio data-bursts

5.3.1 The MAT data

The MAT bitstream consists of a sequence of MAT frames. The data-type bits 0-4 of a MAT data-burst is 22, and the data-type bits 5-6 is 0. When MAT data is being transmitted, the transmission device shall ensure that both the data-type bits 0-4 and data-type bits 5-6 values are set correctly. Additionally, the receiving device shall utilize both the data-type bits 0-4 and data-type bits 5-6 values to ensure that the content of the data-burst is correctly identified as MAT. The MAT data-burst is headed with a burst-preamble, followed by the burst-payload. The structure of the MAT data-burst is shown in Figure 1.

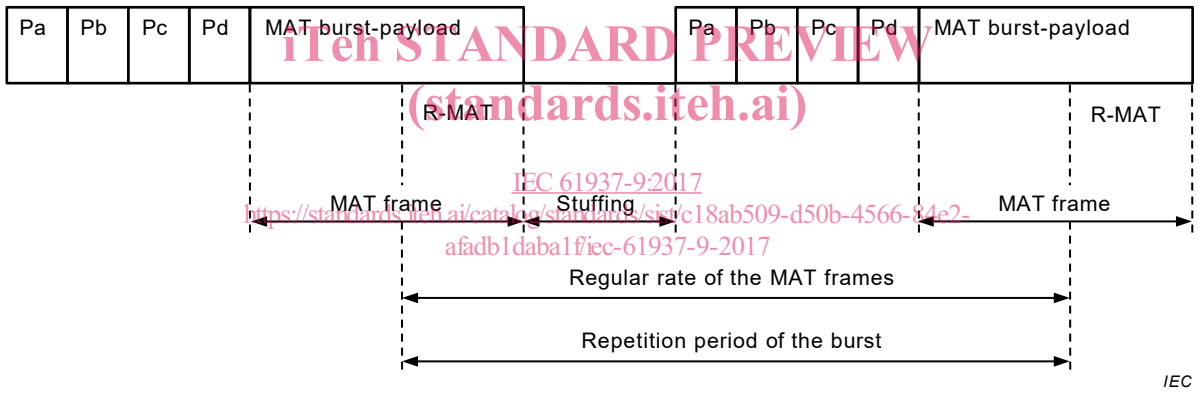

Figure 1 – MAT data-burst

The data-type-dependent information of bits 8-12 for MAT is given in Table 4.

Table 4 – Data-type-dependent information for MAT

Bits of Pc LSB..MSB	Bit 12 value	Bits 8 to 11 value	Repetition period of the data-burst
8 to 12	0	0	15 360 IEC 60958 frames
	1	See Table 8	As specified in Table 8

The MAT burst-payload shall always contain a single MAT frame. The transmission device shall ensure that the MAT burst-payload is constructed only from a single complete MAT frame. It is prohibited to transmit a single MAT frame using multiple data-bursts. The length of the MAT data-burst will depend on the encoded bit rate (which determines the MAT frame length).

Table 5 shows the relation between the sampling frequency of MAT-encoded audio and the IEC 60958 frame rate used to deliver MAT data via the IEC 61937 interface. The repetition