BRITISH STANDARD

BS EN
61937-9:2007

Digital audio — Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 —

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

The European Standard EN 61937-9:2007 has the status of a British Standard

ICS 33.160.30; 35.040

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 61937-9:2007. It is identical to IEC 61937-9:2007.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English version

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

(IEC 61937-9:2007)

Audionumérique - Interface pour les flux de bits audio à codage MIC non linéaire conformément à la CEI 60958 - Partie 9: Flux de bits PCM non linéaire conformément au format MAT (CEI 61937-9:2007)

Digitalton - Schnittstelle für nichtlinear-PCM-codierte Audio-Bitströme unter Verwendung von IEC 60958 - Teil 9: Nichtlineare PCM-Bitströme entsprechend MAT-Format (IEC 61937-9:2007)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 100/1198/CDV, future edition 1 of IEC 61937-9, prepared by technical area 4: Digital system interfaces and protocols of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel Unique Acceptance Procedure and was approved by CENELEC as EN 61937-9 on 2007-10-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2008-07-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2010-10-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61937-9:2007 was approved by CENELEC as a European Standard without any modification.

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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 Standards contain provisions which, through reference in the text, referenced documents are indispensable for the application 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 bitstreams applying IEC 60958 – Part 1: General*

IEC 61937-2:2007, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 2: Burst info*

3 Terms, definitions and abbreviations

For the purpose of this standard, the following definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1
latency
delay time of an external audio decoder to decode a MAT data-burst, defined as the sum of two values of the receiving delay time and the decoding delay time

3.2 Abbreviations

IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ISO/IEC MPEG	The Moving Picture Experts Group, a joint committee of ISO and IEC
MAT	Metadata-enhanced Audio Transmission

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 and 61937-2.

4.2 MAT burst-info

The 16-bit burst-info contains information about the data which will be found in the data-burst.

Table 1 – Fields of burst-info

Bits of Pc	Value	Contents	Reference point R	Repetition period of data-burst in IEC 60958 frames
0 – 4		Data-type		
	0 – 21	According to IEC 61937		
	22	MAT	R-MAT	15 360
	23 – 31	According to IEC 61937		
5, 6		Sub- data-type		
	0	MAT		
	1 – 3	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, should be used by the transmitter to schedule data-bursts as necessary to establish synchronization between picture and decoded audio.

5.2 Pause data-burst

Pause data-burst for MAT is given in Table 2

Table 2 – Repetition period of the pause data-bursts

Data-type 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 of a MAT data-burst is 22, and the sub-data-type is 0. When MAT data is being transmitted, the transmission device shall ensure that both the data-type and sub-data-type values are set correctly. Additionally, the receiving device shall utilize both the data-type and sub data-type values to ensure that the content of the data-burst is correctly identified as MAT. The data-burst is headed with a burst-preamble, followed by the burst-payload. The burst-payload of each MAT data-burst shall contain 1 complete MAT frame.

The length of the MAT data-burst will depend on the encoded bit rate (which determines the MAT frame length).

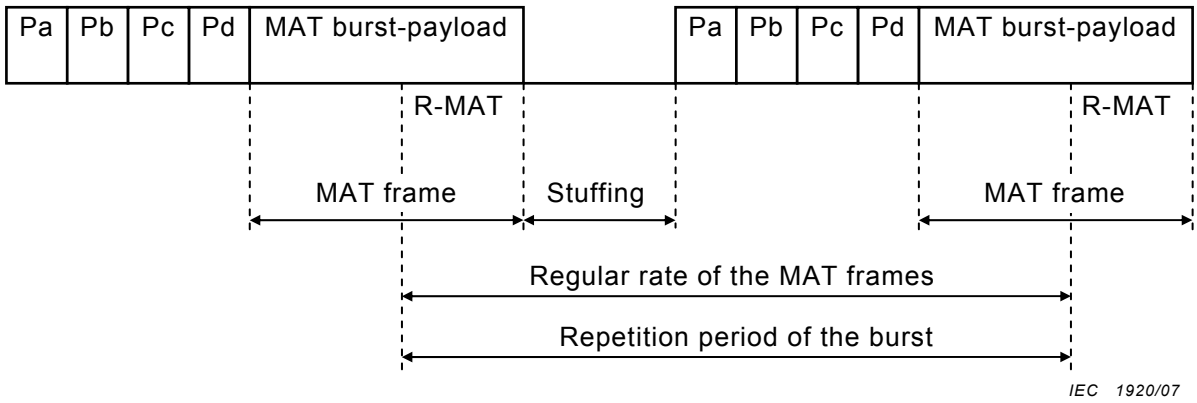

Figure 1 – MAT data-burst

The data-type-dependent information for MAT is given in Table 3.

Table 3 – Data-type-dependent information for MAT

Bits of Pc LSB..MSB	Value	Contents
8 - 12	00h	Reserved, shall be set to '0'

Table 4 shows the relation between the sample rate of MAT encoded audio and the IEC 60958 frame rate used to deliver MAT data via the IEC 61937 interface.

Table 4 – Sample rate of MAT encoded audio and IEC 60958 frame rate

MAT sample rate	IEC 60958 frame rate
48 kHz	768 kHz
96 kHz	768 kHz
192 kHz	768 kHz
44,1 kHz	705,6 kHz
88,2 kHz	705,6 kHz
176,4 kHz	705,6 kHz

The reference point of a MAT data-burst (R-MAT) is the IEC 60958 frame that occurs half-way through the MAT burst-payload. The data-bursts containing MAT frames shall occur at a regular rate, with the reference point of the MAT data-burst beginning 15 360 IEC 60958 frames after the reference point of the preceding MAT data-burst.

The units of **burst-length** shall be in bytes. The maximum size of a MAT burst-payload is 61 424 bytes.

5.3.2 Latency of the MAT decoder

The latency of a MAT decoder which receives this signal is specified, with respect to the reference point of the MAT data-burst, to be equal to the time occupied by 1/12 of a MAT frame (equivalent to 1 280 IEC 60958 frames at the IEC 60958 frame rate).

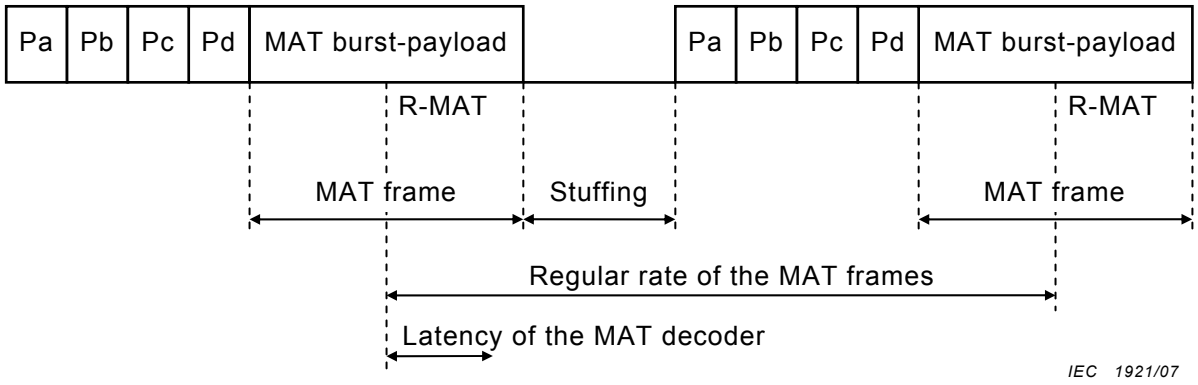

Figure 2 – Latency of MAT decoding

It is recommended that Pause data-bursts are used to fill stream gaps in the MAT bitstream as described in IEC 61937-1, and that pause data-bursts be transmitted with a repetition period of 4 IEC 60958 frames, except when other repetition periods are necessary to fill the precise stream gap length (which may not be a multiple of 4 IEC 60958 frames), or to meet the requirement on burst spacing (refer to IEC 61937-1, 6.3.3).

When a stream gap in a MAT stream is filled by a sequence of pause data-bursts, the Pa of the first pause data-burst shall be located one frame repetition period following the Pa of the previous MAT frame. It is recommended that the sequence(s) of Pause data-bursts which fill the stream gap should continue from this point up to (as close as possible considering the 4 IEC 60958 frame length of the Pause data-burst) the Pa of the first MAT data-burst which follows the stream gap.

The gap length parameter contained in the pause data-burst is intended to be interpreted by the MAT decoder as an indication of the number of decoded PCM samples which are missing (due to the resulting audio gap). If the sizes of the MAT frames before and after the stream gap are not equal (due to a bitrate change in the interrupted MAT bitstream), this value may differ from the actual number of sampling periods of the audio contained in the stream gap due to the definition of the MAT data-burst reference points.

Bibliography

The following document has served as a reference for the specification of the related data-type and other parts of IEC 61937.

	Reference
Technical Bulletin	Dolby ® True HD Transmission over the HDMI™ Interface

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60958	Series	Digital audio interface	EN 60958	Series
IEC 61937-1	2007	Digital audio - Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 - Part 1: General	EN 61937-1	2007
IEC 61937-2	2007	Digital audio - Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 - Part 2: Burst-info	EN 61937-2	2007

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