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First edition
2003-05

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

Part 2:
Burst-info

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2: Burst-info

FOREWORD

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International Standard IEC 61937-2 has been prepared by technical area 4: Digital system interfaces, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This standard cancels and replaces IEC 61937, published in 2000, which has been divided into four parts (see below). This first edition constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
100/645/FDIS	100/671/RVD

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

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

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IEC 61937 consists of the following parts under the general title *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958:*

Part 1: General

Part 2: Burst-info

Part 3: Non-linear PCM bitstreams according to the AC-3 format

Part 4: Non-linear PCM bistreams according to the MPEG audio formats

Part 5: Non-linear PCM bitstreams according to the DTS (Digital Theatre Systems) format(s)

Part 6: Non-linear PCM bitstreams according to the MPEG-2 AAC format

Part 7: Non-linear PCM bistreams according to the ATRAC and ATRAC2/3 formats

The committee has decided that the contents of this publication will remain unchanged until October 2005. At this date, the publication will be

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- withdrawn;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

The contents of the corrigendum of March 2004 have been included in this copy.

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

Part 2: Burst-info

1 Scope

IEC 60958 specifies a widely used interface for digital audio equipment with two-channel linear PCM audio. This part of IEC 61937 describes how the interface is used to convey non-linear PCM encoded audio streams.

2 Normative references

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.

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

IEC 61937 (all parts), *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958*

ISO/IEC 11172-3:1993, *Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s – Part 3: Audio*

ISO/IEC 13818-3:1998, *Information technology – Generic coding of moving pictures and associated audio information – Part 3: Audio*

ISO/IEC 13818-7:1997, *Information technology – Generic coding of moving pictures and associated audio information – Part 7: Advanced Audio Coding (AAC)*

ITU-R Recommendation BS.1196-1, *Audio coding for digital terrestrial television broadcasting*

3 Terms and definitions

3.1 Definitions

3.1.1
audio data-burst
data-burst with an encoded audio frame as burst-payload

3.1.2
audio data-word
16-bit data word

3.1.3
audio frame
fixed number of audio samples

NOTE The number of samples in an audio frame depends on the particular encoding system which is used to encode the audio frame into the encoded audio frame.

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3.1.4
audio gap
period in the sequence of baseband audio samples where valid samples of audio are not available

3.1.5
bitstream
non-linear PCM encoded audio source, represented in a sequence of bits

NOTE In this interface the bitstream consists of a sequence of data-bursts.

3.1.6
data-burst
packet of data, including the burst-preamble, to be transmitted across the interface

3.1.7
burst-payload
information content of the data-burst

3.1.8
burst-preamble
header for the data-burst, containing synchronization, and information about the data contained in the burst-payload

3.1.9
data-type
reference to the type of payload of the data-bursts

3.1.10
encoded audio frame
minimum decodable unit of an encoded data sequence

NOTE Each encoded audio frame is the encoded representation of a fixed number of audio samples (for each original audio channel). The number of samples that are encoded into an encoded audio frame depends on the particular encoding system which is used to encode the audio frame into the encoded audio frame.

3.1.11
length-code
code indicating the length of the data-burst-payload in bits

3.1.12
repetition period
period between the reference point of the current data-burst, and the reference point of the immediately following data-burst of the same data-type

3.1.13
sampling frequency
sampling frequency of the encoded PCM audio samples (i.e. before encoding and after decoding)

3.1.14
sampling period
time period related to the sampling frequency of the PCM audio samples, represented in the encoded bitstream

3.1.15
stuffing
occupying the unused data capacity of the interface

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3.1.16
stuffing sub-frame
occupying the unused data capacity in 16-bit audio data words

3.1.17
stream gap
period within the encoded audio bitstream without any audio frame; a discontinuity in the bitstream

NOTE Typically, a stream gap will occur between encoded audio frames.

3.2 Abbreviations

3.2.1
AAC
Advanced Audio Coding

3.2.2
ATRAC
Adaptive TRansform Acoustic Coding

3.2.3
ATRAC2
Adaptive TRansform Acoustic Coding 2

3.2.4
ATRAC3
Adaptive TRansform Acoustic Coding 3

3.2.5
ATRAC2/3
ATRAC2 and/or ATRAC3

3.2.6
ATSC
Advanced Television Systems Committee

3.2.7
DTS
Digital Theatre Systems

3.2.8
MPEG
Moving Pictures Expert Group, a joint committee of ISO and IEC

3.2.9
ITU-R
International Telecommunication Union, Radio Communication Bureau

3.2.10
SMPTE
Society of Motion Picture and Television Engineers

3.3 Presentation convention

F872h
Value ‘F872’ in hexadecimal format

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4 Burst-info

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

4.1 Audio data-bursts

4.1.1 General

This clause describes the audio data-bursts. Specific properties such as reference points, repetition period, the method of filling stream gaps, and decoding latency are described for each data-type.

The decoding latency (or delay), indicated for the data-types, is used by the transmitter to schedule data-bursts as necessary to establish synchronization between picture and decoded audio.

4.1.2 AC-3

The AC-3 bitstream consists of a sequence of AC-3-frames. The data-type of an AC-3 data-burst is 01h. An AC-3 frame represents 1536 samples of each encoded audio channel (left, centre, etc.). The data-burst is headed with a burst-preamble, followed by the burst-payload. The burst-payload of each data-burst of AC-3 data contains 1 complete AC-3-frame.

The length of the AC-3 data-burst depends on the encoded bit rate (which determines the AC-3-frame length). The specification for the AC-3 bitstream may be found in ATSC document A/52 or in ITU-R Recommendation BS.1196-1, the burst format is specified in IEC 61937-3.

4.1.3 MPEG-1 ayer-1

An MPEG-1 layer-1 MPEG-frame represents 384 samples of each encoded channel and can be transferred using data-type 04h. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 11172-3 and IEC 61937-4).

4.1.4 MPEG-1 layer-2 or -3 or MPEG-2 without extension

The burst-payload of data type MPEG-1 layer-2 or layer-3, or MPEG-2 without extension, represents 1152 samples of each encoded channel and can be transferred using data-type 05h. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 11172-3, ISO/IEC 13818-3 and IEC 61937-4).

4.1.5 MPEG-2 with extension

The burst-payload of data type MPEG-2 with extension represents 1152 samples of each encoded channel and can be transferred using data type 06h. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 13818-3 and IEC 61937-4).

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Table 1 – Audio data-types

Bits of Pc	Value	Contents	Reference point R	Repetition period of data-burst measured in IEC 60958 frames
0 – 4		Data-type		
	0	Null data		See Note 1
	1	AC-3 data	R-AC-3	1 536
	2	Refer to SMPTE 338M		
	3	Pause	bit 0 of Pa	See Note 2
	4	MPEG-1 layer-1 data	bit 0 of Pa	384
	5	MPEG-1 layer-2 or -3 data or MPEG-2 without extension	bit 0 of Pa	1 152
	6	MPEG-2 data with extension	bit 0 of Pa	1 152
	7	MPEG-2 AAC	bit 0 of Pa	1 024
	8	MPEG-2, layer-1 low sampling frequency	bit 0 of Pa	768
	9	MPEG-2, layer-2 low sampling frequency	bit 0 of Pa	2 304
	10	MPEG-2, layer-3 low sampling frequency	bit 0 of Pa	1 152
	11	DTS type I	bit 0 of Pa	512
	12	DTS type II	bit 0 of Pa	1 024
	13	DTS type III	bit 0 of Pa	2 048
	14	ATRAC	bit 0 of Pa	512
	15	ATRAC 2/3	bit 0 of Pa	1 024
	16 – 26	Reserved		
	27-30	Refer to SMPTE 338M		
	31	Extended data-type		
5, 6	00	Reserved		
7	0	Error-flag indicating a valid burst-payload		
	1	Error-flag indicating that the burst-payload may contain errors		
8 – 12		Data-type-dependent info		
13 – 15	0 – 7	Bitstream number		

NOTE 1 Refer to 7.3 of IEC 61937-1.

NOTE 2 The repetition period of pause data-bursts depends on the application. The repetition period of pause data-bursts is defined for each audio data-burst.

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4.1.6 MPEG-2 AAC

The payload of data type MPEG-2 AAC represents 1024 samples of each encoded channel and can be transferred using data-type 07h. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 13818-7 and IEC 61937-6).

4.1.7 MPEG-2 layer-1 low sampling frequency

An MPEG-2 layer-1 frame with low sampling frequency represents 384 samples of each encoded channel and can be transferred using data-type 08h. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 13818-3 and IEC 61937-4).

4.1.8 MPEG-2 layer-2 low sampling frequency

The payload of data-type MPEG-2 layer-2 frame with low sampling frequency represents 1 152 samples of each encoded channel and can be transferred using data-type 09h. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 13818-3 and IEC 61937-4).

4.1.9 MPEG-2 layer-3 low sampling frequency

The payload of data-type MPEG-2 layer-3 frame with low sampling frequency represents 576 samples of each encoded channel and can be transferred using data-type 0Ah. The data-burst is headed with a burst-preamble, followed by the burst-payload (see ISO/IEC 13818-3 and IEC 61937-4).

4.1.10 DTS type I

The payload of data type DTS type I represents 512 samples of each encoded channel and can be transferred using data-type 0Bh. The data-burst is headed with a burst-preamble, followed by the burst-payload (see IEC 61937-5).

4.1.11 DTS type II

The payload of data type DTS type II represents 1024 samples of each encoded channel and can be transferred using data-type 0Ch. The data-burst is headed with a burst-preamble, followed by the burst-payload (see IEC 61937-5).

4.1.12 DTS type III

The payload of data type DTS type III represents 2048 samples of each encoded channel and can be transferred using data-type 0Dh. The data-burst is headed with a burst-preamble, followed by the burst-payload (see IEC 61937-5).

4.1.13 ATRAC

The payload of data type ATRAC represents 512 samples of each encoded channel and can be transferred using data-type 0Eh. The data-burst is headed with a burst-preamble, followed by the burst-payload (see IEC 61937-7).

4.1.14 ATRAC 2/3

The payload of data type ATRAC 2/3 represents 1024 samples of each encoded channel and can be transferred using data-type 0Fh. The data-burst is headed with a burst-preamble, followed by the burst-payload (see IEC 61937-7).

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Bibliography

The following documents have served as references for the specification of the related data-type and other parts of IEC 61937.

IEC 61909: *Audio recording – Minidisc system*

SMPTE 337M, *Format for Non-PCM Audio and Data in an AES3 Serial Digital Audio Interface*

SMPTE 338M, *Format for Non-PCM Audio and Data in AES3 – Data Types*

SMPTE 339M, *Format for Non-PCM Audio and Data in AES3 – Generic Data Types*

SMPTE 340M, *Format for Non-PCM Audio and Data in AES3 – ATSC A/52 (AC-3) Data Type*

SMPTE 341M, *Format for Non-PCM Audio and Data in AES3 – Captioning Data Types*

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