



# SLOVENSKI STANDARD

## SIST EN 61937:2003

01-december-2003

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### Digital audio - Interface for non-linear PCM encoded audio bitstreams applying (IEC 61937:2000)

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

Digitalton - Schnittstelle für nichtlinear-PCM-codierte Audio-Bitströme unter Verwendung von IEC 60958

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Audionumérique - Interface pour les flux de bits audio à codage MIC non linéaire conformément à la CEI 60958

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**Ta slovenski standard je istoveten z: EN 61937:2000**

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#### **ICS:**

33.160.30	Avdio sistemi	Audio systems
35.200	Vmesniška in povezovalna oprema	Interface and interconnection equipment

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EUROPEAN STANDARD

**EN 61937**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2000

ICS 33.160.01

English version

**Digital audio -  
Interface for non-linear PCM encoded audio bitstreams  
applying IEC 60958  
(IEC 61937:2000)**

Audionumérique -  
Interface pour les flux de bits audio  
à codage MIC non linéaire conformément  
à la CEI 60958  
(CEI 61937:2000)

Digitalton -  
Schnittstelle für nicht-PCM-codierte  
Audio-Bitströme unter Verwendung  
von IEC 60958  
(IEC 61937:2000)

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# CENELEC

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

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

## Foreword

The text of document 100C/260/FDIS, future edition 1 of IEC 61937, prepared by SC 100C, Audio, video and multimedia subsystems and equipment, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61937 on 2000-08-01.

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) 2001-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-08-01

Annexes designated "normative" are part of the body of the standard.  
In this standard, annexes A and ZA are normative.  
Annex ZA has been added by CENELEC.

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### Endorsement notice

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

### 1 Scope

This International Standard applies to the digital audio interface using the IEC 60958 series for the conveying of non-linear PCM encoded audio bitstreams.

It describes a way in which this digital interface can be used in consumer applications.

The professional mode (AES/EBU) is not considered within the scope of this standard.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60958-1:1999, *Digital audio interface – Part 1: General*

IEC 60958-3:1999, *Digital audio interface – Part 3: Consumer applications*

<https://standards.iteh.ai/catalog/standards/sist/28c6e042-0469-40ac-b08f->

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 13818-3:1995, *Information technology – Generic coding of moving pictures and associated audio information – Part 3: Audio*

ITU-R Recommendation BS.1196:1995, *Audio coding for digital terrestrial television*

### 3 Definitions and abbreviations

#### 3.1 Definitions

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

##### 3.1.1

##### **audio data-burst**

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

##### 3.1.2

##### **audio frame**

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

**3.1.3****audio gap**

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

**3.1.4****base frame**

MPEG-1 compatible part of the MPEG-2 encoded audio frame (see ISO/IEC 13818-3)

**3.1.5****bitstream**

non-linear PCM encoded audio source represented in a sequence of bits. 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

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**3.1.10****encoded audio frame**

minimum decodable unit of an encoded data sequence. Each encoded audio frame is the encoded representation of a fixed number of audio samples (for each original audio channel). The number of samples which 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****extension frame**

one encoded frame out of the MPEG extension bitstream (see ISO/IEC 13818-3)

**3.1.12****idle**

state of the interface when IEC 60958 is not used to convey any sequence of data-bursts or PCM data. The channel status data is still active (bit b1 is set to "1" when further non-linear PCM encoded audio is anticipated, see annex A)

**3.1.13****IEC 60958 frame**

sequence of two successive and associated IEC 60958 subframes

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**3.1.14****length-code**

indication of the length of the data-burst-payload in bits

**3.1.15****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

**3.1.16****sampling frequency**

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

**3.1.17****sampling period**

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

**3.1.18****symbol frequency**

frequency of the bits on IEC 60958

**3.1.19****stuffing**

occupying the unused data capacity of the interface

**3.1.20****stuffing sub-frame**

occupying the unused data capacity in IEC 60958 subframes

**3.1.21****IEC 60958 sub-frame**

defined in IEC 60958 to convey a 16-bit to 24-bit data word

**3.1.22****stream gap**

period within the encoded audio bitstream without any audio frame; discontinuity in the bitstream. Typically, a stream gap will occur between encoded audio frames

**3.1.23****symbol**

representation of one bit of IEC 60958

**3.2 Abbreviations**

ATSC	Advanced Television Systems Committee
IEC	International Electrotechnical Commission
ISO/IEC MPEG	Moving Pictures Expert Group
ITU-R	International Telecommunication Union, Radiocommunication

**3.3 Presentation convention**

F872h	Value "F872" in hexadecimal format
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## 4 General

The format of the IEC 60958 interface consists of a sequence of IEC 60958 subframes. Each IEC 60958 subframe is normally used to carry one linear PCM sample, but may also be used to convey data. The non-linear PCM encoded audio bitstreams to be transported over this interface are formed into a sequence of data-bursts.

Each data-burst consists of a 64-bit burst-preamble, followed by the burst-payload. The burst-preamble consists of a sync-word, information about the burst-payload and a bitstream number.

The interface may convey one or more bitstreams. Each type of bitstream may impose a particular requirement for the repetition period for the data-bursts which make up the bitstream (see clause 7).

The 16 bits of a data-burst are placed in time-slots 12 to 27 of an IEC 60958 subframe. Both odd and even IEC 60958 subframes (ch1, ch2) are simultaneously used to carry 32 bits of data. This allows IEC 60958, in the consumer mode, to convey either two-channel linear PCM audio, or a set of non-linear PCM encoded bitstreams (alternating data words), but not both simultaneously.

## 5 Interface format

The interface format as defined in IEC 60958-1 and IEC 60958-3 shall be used.

## 6 Mapping of the audio bitstream on to IEC 60958

### 6.1 Coding of the bitstream

The non-linear PCM encoded audio bitstream is transferred using the basic 16-bit data area of the IEC 60958 subframes, i.e. in time-slots 12 to 27. Because the non-linear PCM encoded audio bitstream to be transported is at a lower data rate than that supported by the IEC 60958 interface, the audio bitstream is broken into a sequence of discrete data-bursts, and stuffing between the data-bursts is necessary (see 6.3).

Each data-burst contains data of an encoded audio frame which is the encoded representation of a fixed number of audio samples per PCM audio channel. The number of samples to be encoded into an encoded audio frame depends on the particular encoding system.

It is possible for this interface to convey simultaneously multiple non-linear PCM encoded audio bitstreams. One of the applications of this capability would be to convey both a main audio service and an associated audio service.

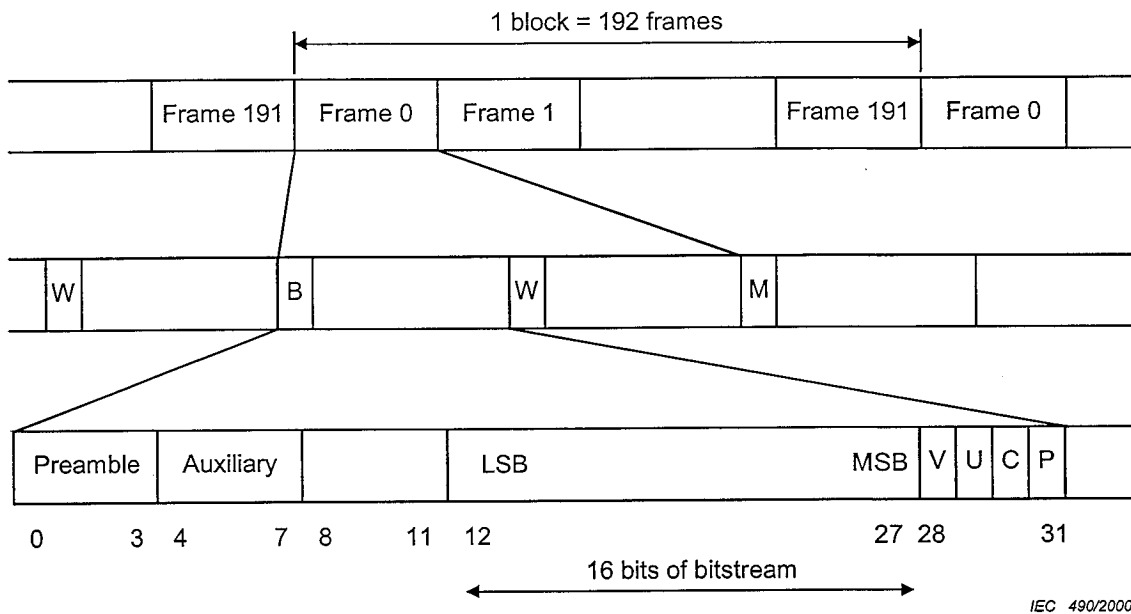


Figure 1 – IEC 60958 interface format

Table 1 – Bit allocation of IEC 60958 frame

Field	IEC 60958 time-slot	Value
0 – 3	Preamble	IEC 60958 preamble
4 – 7	Auxiliary field	Not used, all "0"
8 – 11	Unused data bits	Not used, all "0"
12 – 27	16-bit data	Sections of the bitstream
28	Validity flag	According to IEC 60958
29	User data	According to IEC 60958
30	Channel status	According to IEC 60958
31	Parity bit	According to IEC 60958

### 6.1.1 Bit map of bitstream

The method to place the data into the IEC 60958 bitstream is to format the data to be transmitted into data-bursts, and to send each data-burst in a continuous sequence of IEC 60958 frames.

Table 2 – Bit allocation of data-burst in IEC 60958 subframes

Subframe	Bit of subframe				
	MSB b27	b26	b25.....b14	b13	LSB b12
Frame 0; subframe B or M	1	1		14	15
Frame 0; subframe W	16	17		30	31
Frame 1; subframe B or M	32	33		46	47
Frame 1; subframe W	48	49		62	63
Frame 2; subframe B or M	64	65		78	79
-----			-----		
Last subframe B or M of data-burst	n-32	n-31		n-18	n-17
Last subframe W of data-burst	n-16	n-15		n-2	n-1

Considering the data within an IEC 60958 subframe as a 16-bit word out of a serial stream of bits, the first bit of the burst-payload in a data-burst would occupy the MSB of subframe 1 (time-slot 27), and the 32nd bit would occupy the LSB (or what would be the LSB for 16-bit PCM audio) of subframe 2 (time-slot 12). The next 32 bits of the burst-payload would occupy the next IEC 60958 frame. The last data bits of the audio data-burst might occupy only a fraction of the last frame. Any unused bits in the last frame will be ignored by the receiver. In the case where the audio data-burst contains a multiple of 16 bits, all used IEC 60958 subframes are completely filled. When it is not a multiple of 16 bits, the bits of the burst-payload to be conveyed in the last IEC 60958 subframe will be MSB aligned; the remaining bits shall be stuffed with "0"s.

### 6.1.2 IEC 60958 validity flag

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It is recommended to set the validity bit to a logical "1". This is intended to prevent accidental decoding of non-audio data to analogue before a complete channel status block is received.

### 6.1.3 IEC 60958 channel status bit 1

The purpose of channel status bit 1 is to indicate if IEC 60958 is used to convey linear PCM, or to indicate that the interface is used for other purposes (see annex A). This bit shall be set to "1" when IEC 60958 is used to convey non-linear PCM encoded audio bitstreams.

### 6.1.4 Symbol frequency

When the IEC 60958 bitstream conveys linear PCM audio, the symbol frequency is 64 times the PCM sampling frequency (32 time-slots per PCM sample times two channels). When a non-linear PCM encoded audio bitstream is conveyed by the interface, the symbol frequency shall be 64 times the sampling rate of the encoded audio within that bitstream. But in the case where a non-linear PCM encoded audio bitstream is conveyed by the interface containing audio with low sampling frequency (see 7.2.5 and 7.2.6), the symbol frequency shall be 128 times the sampling rate of the encoded audio within that bitstream.