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Second edition
2003-01

Digital audio interface –

**Part 3:
Consumer applications**

Interface audionumérique –

*Partie 3:
Applications grand public*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DIGITAL AUDIO INTERFACE –

Part 3: Consumer applications

FOREWORD

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International Standard 60958-3 has been prepared by technical area 4, Digital system interfaces, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition of IEC 60958-3 cancels and replaces the first edition published in 1999 and constitutes a technical revision.

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

FDIS	Report on voting
100/559/FDIS	100/611/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.

IEC 60958 consists of the following parts under the general title *Digital audio interface*:

Part 1: General

Part 3: Consumer applications

Part 4: Professional applications

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

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- withdrawn;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

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DIGITAL AUDIO INTERFACE –

Part 3: Consumer applications

1 Scope

This part of IEC 60958 specifies the consumer application of the interface for the interconnection of digital audio equipment defined in IEC 60958-1.

NOTE When used in a consumer digital processing environment, the interface is primarily intended to carry stereophonic programmes, with a resolution of up to 20 bits per sample, an extension to 24 bits per sample being possible.

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 60268-11:1987, *Sound system equipment – Part 11: Application of connectors for the interconnection of sound system components*

IEC 60841:1988, *Audio recording – PCM encoder/decoder system*

IEC 60908:1999, *Audio recording – Compact disc digital audio system*

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

IEC 60958-4, *Digital audio interface – Part 4: Professional applications*

IEC 61119-1:1992, *Digital audio tape cassette system (DAT) – Part 1: Dimensions and characteristics*

IEC 61119-6:1992, *Digital audio tape cassette system (DAT) – Part 6: Serial copy management system*

3 Terms and definitions

The terms and definitions given in IEC 60958-1 apply to this part of IEC 60958.

4 Interface format

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

Unless otherwise specified in the annexes, the following specification is applicable:

- An audio sample word has a length of 20 bits/sample. The auxiliary sample bits are an optional expansion of the audio sample, if not used = “0”.
- User data is not used, all bits = “0”.
- Channel status is identical for both sub-frames of the interface, with the exception of the channel number, if that is not equal to zero.

5 Channel status

5.1 General

For every sub-frame, the channel status bit provides information related to the audio channel that is carried in that same sub-frame.

Channel status information is organized in a 192-bit block, subdivided into 24 bytes, numbered 0 to 23 (see Table 1). The first bit of each channel status block is carried in the frame with preamble "B".

The individual bits of a channel status block are numbered 0 to 191.

The primary application is indicated by channel status bit 0.

As stated in IEC 60958-1, for the consumer digital audio applications described in this standard, this first channel status bit equals "0".

NOTE As stated in IEC 60958-1, for professional application this first channel status bit equals "1".

Secondary applications may be defined within the framework of these primary applications.

5.2 Application

5.2.1 Channel status general format

For each channel, the channel status block provides the information described in this clause and summarized in Table 1.

Table 1 – Channel status general format for consumer use

Byte

0	a = "0"	b	c	d			Mode	
bit	0	1	2	3	4	5	6	7
1								
bit	8	9	10	11	12	13	14	15
2								
bit	16	17	18	19	20	21	22	23
3								
bit	24	25	26	27	28	29	30	31
4								
bit	32	33	34	35	36	37	38	39
5								
bit	40	41	42	43	44	45	46	47
6								
bit	48	49	50	51	52	53	54	55
7								
bit	56	57	58	59	60	61	62	63
8								
bit	64	65	66	67	68	69	70	71
9								
bit	72	73	74	75	76	77	78	79
10								
bit	80	81	82	83	84	85	86	87
11								
bit	88	89	90	91	92	93	94	95
12								
bit	96	97	98	99	100	101	102	103
13								
bit	104	105	106	107	108	109	110	111
14								
bit	112	113	114	115	116	117	118	119
15								
bit	120	121	122	123	124	125	126	127
16								
bit	128	129	130	131	132	133	134	135
17								
bit	136	137	138	139	140	141	142	143
18								
bit	144	145	146	147	148	149	150	151
19								
bit	152	153	154	155	156	157	158	159
20								
bit	160	161	162	163	164	165	166	167
21								
Bit	168	169	170	171	172	173	174	175
22								
Bit	176	177	178	179	180	181	182	183
23								
Bit	184	185	186	187	188	189	190	191
a: use of channel status block. b: linear PCM identification.				c: copyright information. d: additional format information.				

Byte 0: General control and mode information**Control:**

Bit 0	“0”	Consumer use of channel status block. (see notes 1 and 2)
-------	-----	---

NOTE 1 The significance of byte 0, bit 0 is such that transmission from an interface conforming to IEC 60958-4 can be identified.

Bit 1	“0”	Audio sample word represents linear PCM samples. (see note 2)
	“1”	Audio sample word used for other purposes.

NOTE 2 The functions of channel status bits 0 and 1 are defined in IEC 60958-1.

Bit 2	“0”	Software for which copyright is asserted. (see note 3)
	“1”	Software for which no copyright is asserted.

NOTE 3 Bit 2 is referred to as the “Cp-bit”. It should indicate whether copyright protection has been asserted.

The copyright status may be unknown for certain applications. The above interpretation is therefore not valid in combination with some category codes (as indicated in the annex associated with the category code). The Cp-bit can alternate between 0 and 1 at a rate between 4 Hz and 10 Hz (see Annex A).

Bits 3 to 5	Additional format information, meaning depends on bit 1.
-------------	--

When bit 1 = “0”, linear PCM audio mode:

Bit	3 4 5	
State	“0 0 0”	2 audio channels without pre-emphasis.
	“1 0 0”	2 audio channels with 50 μ s / 15 μ s pre-emphasis.
	“0 1 0”	Reserved (for 2 audio channels with pre-emphasis).
	“1 1 0”	Reserved (for 2 audio channels with pre-emphasis).

All other states of bits 3 to 5 are reserved and shall not be used until further defined.

NOTE 4 The single and dual channel operating modes are defined with the frame format in IEC 60958-1.

When bit 1 = “1”, other than linear PCM applications:

Bit	3 4 5	
State	“0 0 0”	Default state for applications other than linear PCM.

All other states of bits 3 to 5 are reserved and shall not be used until further defined.

Bits 6 and 7	Channel status mode, indicates one of four possible channel status formats (bytes 1 to 23). There are four possible modes for each of the states of bit 1.
--------------	--

Bit	6 7	
State	“0 0”	Mode 0, refer to 5.2.2.

All other states of bits 6 and 7 are reserved and shall not be used until further defined.

The contents of bits 8 to 191 depend on the mode as indicated by bits 6 and 7. If not defined otherwise, the default value is “0”.

5.2.2 Mode 0 channel status format for digital audio equipment for consumer use

When the audio sample word represents linear PCM and the channel status mode is mode 0, the channel status format shown in Table 2 should be applied.

Table 2 – Mode 0 channel status format for consumer use

Byte

0	a = "0"	b = "0"	c	d			Mode = "0 0"	
bit	0	1	2	3	4	5	6	7
1	Category code							
bit	8	9	10	11	12	13	14	15
2	Source number				Channel number			
bit	16	17	18	19	20	21	22	23
3	Sampling frequency				Clock accuracy			
bit	24	25	26	27	28	29	30	31
4	Word length				Original sampling frequency			
bit	32	33	34	35	36	37	38	39
5								
bit	40	41	42	43	44	45	46	47
6								
bit	48	49	50	51	52	53	54	55
7								
bit	56	57	58	59	60	61	62	63
8								
bit	64	65	66	67	68	69	70	71
9								
bit	72	73	74	75	76	77	78	79
10								
bit	80	81	82	83	84	85	86	87
11								
bit	88	89	90	91	92	93	94	95
12								
bit	96	97	98	99	100	101	102	103
13								
bit	104	105	106	107	108	109	110	111
14								
bit	112	113	114	115	116	117	118	119
15								
bit	120	121	122	123	124	125	126	127
16								
bit	128	129	130	131	132	133	134	135
17								
bit	136	137	138	139	140	141	142	143
18								
bit	144	145	146	147	148	149	150	151
19								
bit	152	153	154	155	156	157	158	159
20								
bit	160	161	162	163	164	165	166	167
21								
bit	168	169	170	171	172	173	174	175
22								
bit	176	177	178	179	180	181	182	183
23								
bit	184	185	186	187	188	189	190	191
a: use of channel status block.				c: copyright information.				
b: linear PCM identification.				d: additional format information.				

Byte 0 as defined in 5.2.1, with:

Bit 1	“0”	Audio sample word represents linear PCM samples.
Bits 6 to 7	“0 0”	Mode 0.

Byte 1: Category code

The category code indicates the kind of equipment that generates the digital audio interface signal. See the relevant annexes for the assignments. Bit 8 = LSB, bit 15 = MSB.

Byte 2: Source and channel number

Bits 16 to 19	Source number, bit 16 = LSB, bit 19 = MSB.	
Bit	16 17 18 19	
State	“0 0 0 0”	Do not take into account.
	“1 0 0 0”	1
	“0 1 0 0”	2
	“1 1 0 0”	3
	
	“1 1 1 1”	15
Bits 20 to 23	Channel number (audio channel), bit 20 = LSB, bit 23 = MSB.	
Bit	20 21 22 23	
State	“0 0 0 0”	Do not take into account.
	“1 0 0 0”	(left channel for stereo channel format).
	“0 1 0 0”	(right channel for stereo channel format).
	“1 1 0 0”	
	
	“1 1 1 1”	

NOTE 1 The single and dual channel operating modes are defined with the frame format in IEC 60958-1.

Byte 3: Sampling frequency and clock accuracy

Bits 24 to 27	Sampling frequency	
Bit	24 25 26 27	
State	“0 0 1 0”	22,05 kHz
	“0 0 0 0”	44,1 kHz
	“0 0 0 1”	88,2 kHz
	“0 0 1 1”	176,4 kHz
	“0 1 1 0”	24 kHz
	“0 1 0 0”	48 kHz
	“0 1 0 1”	96 kHz
	“0 1 1 1”	192 kHz
	“1 1 0 0”	32 kHz
	“1 0 0 0”	Sampling frequency not indicated

All other combinations are reserved and shall not be used until further defined.

Bits 28 to 29	Clock accuracy.	
Bit	28	29
State	"0 0"	Level II
	"1 0"	Level I
	"0 1"	Level III
	"1 1"	Interface frame rate not matched to sampling frequency.

Byte 4: Word length and original sampling frequency

Bit 32	"0"	Maximum audio sample word length is 20 bits.			
	"1"	Maximum audio sample word length is 24 bits.			
Bits 33 to 35	Sample word length				
Bit	33	34	35	Audio sample word length if maximum length is 24 bits as indicated by bit 32.	Audio sample word length if maximum length is 20 bits as indicated by bit 32.
State	"0 0 0"	Word length not indicated (default)		Word length not indicated (default)	
	"1 0 0"	20 bits		16 bits	
	"0 1 0"	22 bits		18 bits	
	"0 0 1"	23 bits		19 bits	
	"1 0 1"	24 bits		20 bits	
	"0 1 1"	21 bits		17 bits	

All other combinations are reserved and shall not be used until further defined.

NOTE 2 The first edition of IEC 60958 had bits 32 to 35 reserved and set to zero. Therefore, the all zero state for these bits on a received signal may be an indicator that the word length indication has not been implemented.

Bits 36 to 39	Original sampling frequency			
Bit	36	37	38	39
State	"1 1 1 1"	44,1 kHz		
	"1 1 1 0"	88,2 kHz		
	"1 1 0 1"	22,05 kHz		
	"1 1 0 0"	176,4 kHz		
	"1 0 1 1"	48 kHz		
	"1 0 1 0"	96 kHz		
	"1 0 0 1"	24 kHz		
	"1 0 0 0"	192 kHz		
	"0 1 1 1"	Reserved		
	"0 1 1 0"	8 kHz		
	"0 1 0 1"	11,025 kHz		
	"0 1 0 0"	12 kHz		
	"0 0 1 1"	32 kHz		
	"0 0 1 0"	Reserved		
	"0 0 0 1"	16 kHz		
	"0 0 0 0"	Original sampling frequency not indicated (default)		