

TECHNICAL SPECIFICATION

Guideline for implementation of copy controlled multimedia interface

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**GUIDELINE FOR IMPLEMENTATION OF
COPY CONTROLLED MULTIMEDIA INTERFACE**

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62436, which is a technical specification, has been prepared by technical area 4: Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
100/1231/DTS	100/1334/RVC

Full information on the voting for the approval of this technical specification 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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

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INTRODUCTION

Various IEC standards have included methods for transmission of copy control information at the time when they were developed. For instance, IEC 61119-6 defines copyright status bit for DAT recorder, and IEC 60958-3 defines the L bit that is specified in IEC 61119-6.

The current consumer products become more complex and use the many IEC standards in one product.

For instance, a DVD player produces its high quality audio signal securely through IEC 61883-6, it also performs CD quality audio signal through IEC 60958 or IEC 61937, and the DVD player can produce audio signals through the other interface using IEC 60958 conformant data format, defined in IEC 61883-6.

Another example is a digital video recorder with hard disk drive or DVD that produces audio signal to the other audio recorder using IEC 60958 or IEC 61883-6.

These consumer products use many interface standards and should give copy control information and other information appropriately.

This guideline describes

- the relation between digital interface standards,
- the relation of copy control information and related information,
- the method for information implementation.

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GUIDELINE FOR IMPLEMENTATION OF COPY CONTROLLED MULTIMEDIA INTERFACE

1 Scope

This Technical Specification gives a guideline for the implementation of the audio and video interfaces with copy control information.

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

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

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

IEC 61880-2, *Video systems (525/60) – Video and accompanied data using the vertical blanking interval – Analogue interface – Part 2: 525 progressive scan system*

IEC 61883-6, *Consumer audio/video equipment – Digital interface – Part 6: Audio and music data transmission protocol*

IEC 61909, *Audio recording – Minidisc system*

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

IEC 61937-1, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 1: General*

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

IEC 62375, *Video systems (625/50 progressive) – Video and accompanied data using the vertical blanking interval – Analogue interface*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

IEC 60958 conformant data format

data format that has conformance with the data protocol defined in of IEC 60958

3.2 Abbreviations

SCMS	serial copy management system, for copy management of one generation
CCI	copy control information
CGMS-A	copy generation management system on analogue video interface

4 Relation between interface standards and specifications

4.1 IEC standards with copy control information

IEC standards that have information of copy control are described in Table 1, these standards are the subjects of this technical specification.

Table 1 – IEC standards with copy control information

IEC standard	Description of copy control information
IEC 60958-3	Digital audio interface, contains SCMS information
IEC 61937-1, IEC 61937-2, IEC 61937-3, IEC 61937-4, IEC 61937-5, IEC 61937-6, IEC 61937-7, IEC 61937-8, IEC 61937-9	Digital audio interface, contains SCMS information (note 1)
IEC 61883-6	Digital audio interface, contains SCMS and Audio CCI (note 2)
IEC 61119-6	Digital audio tape cassette system, defines SCMS
IEC 61909	Minidisc system, describes SCMS
IEC 61880-2	525 progressive video system, defines VBI with CGMS-A
IEC 62375	625 progressive video system, defines VBI with CGMS-A
NOTE 1 IEC 61937 does not describe SCMS, that come from the structure of IEC 60958.	
NOTE 2 SCMS is contained in the IEC 60958 conformant data format.	

4.2 Relation between IEC standards

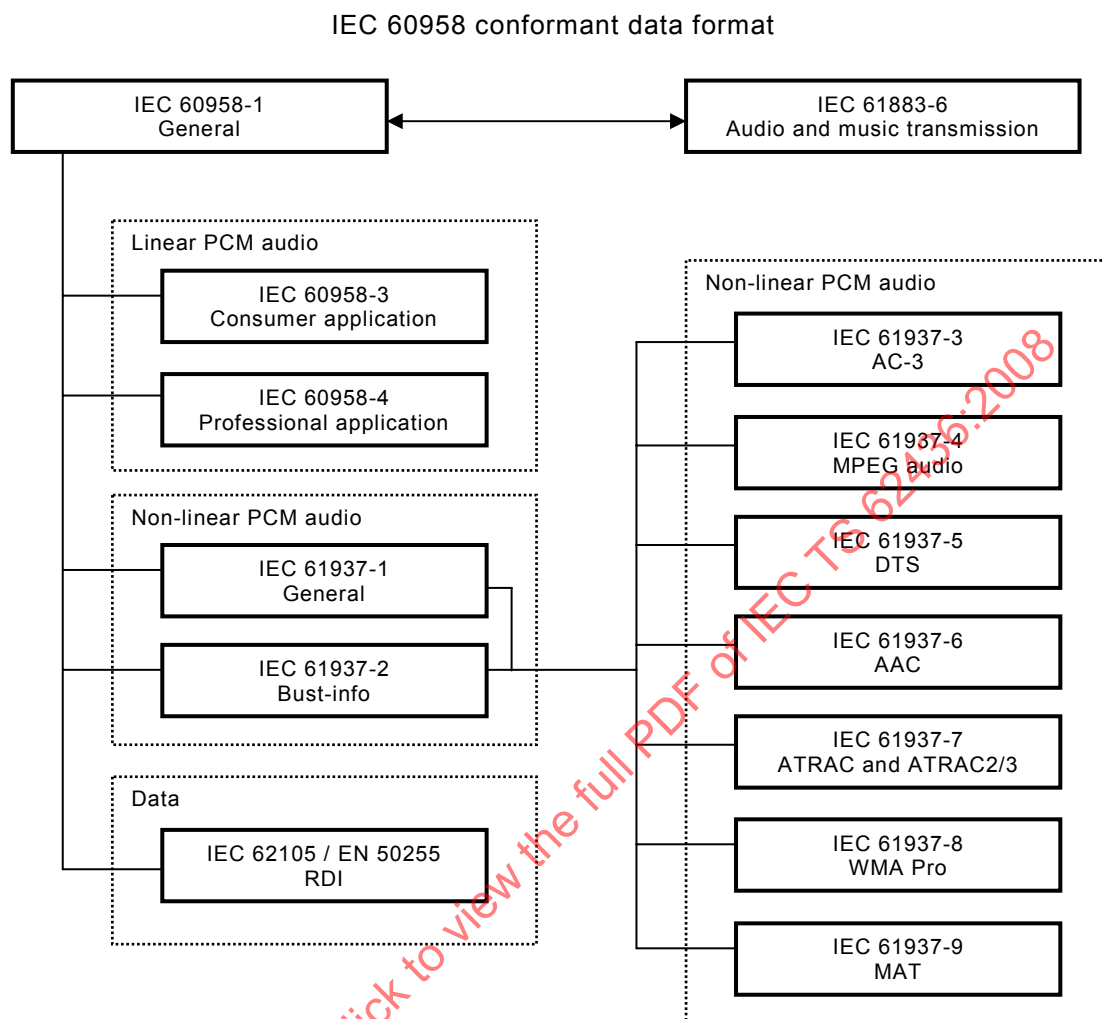
Figure 1 shows the relation between digital audio interface standards IEC 60958, IEC 61937 and IEC 61883-6.

IEC 60958-1 is the fundamental standard of these related standards, and it defines the basic structure. The application standards derived from IEC 60958-1 for the linear PCM audio data transmission are IEC 60958-3 for consumer use and IEC 60958-4 for professional use.

IEC 61937 is derived from IEC 60958, it specifies the data packet structure based on IEC 60958-1, it is mainly for the transmission of compressed audio data. IEC 61937-1 and IEC 61937-2 specify the general structure. In part 1 and part 2 of IEC 61937, transmission method for the specific compressed audio format are specified from part 3 to part 9. Also IEC 62105 specifies the receiver data transmission using IEC 61937-1 structure.

IEC 61883-6 specifies IEC 60958 conformant data format, this format defines IEC 60958-1 structure in IEC 61883-6. IEC 60958 conformant data format can transmit IEC 60958-1 and all of its derivative standards.

IEC 60958 conformant data format can be used in any other interface specification applying the definition of the structure of IEC 60958-1.



IEC 195/08

Figure 1 – The relationship between IEC standards

4.3 IEC 60958 conformant data format

4.3.1 The structure defined in IEC 61883-6

IEC 60958 conformant data format is defined by IEC 61883-6, this format defines the use of the frame format and sub-frame format defined in IEC 60958-1 as it is.

Figure 2 shows the sub-frame format of IEC 60958 defined in IEC 60958-1. Figure 3 shows IEC 60958 conformant data format defined in IEC 61883-6. This defines the sync preamble in 2 bits as described in Table 2. The 32 bit data of IEC 61883-6 consists of an 8 bit label and 24 bit data that are called AM824 data, and the label from 00₁₆ to 3F₁₆ are assigned to IEC 60958 conformant data format including the sync preambles and the bits V, U, C and P.

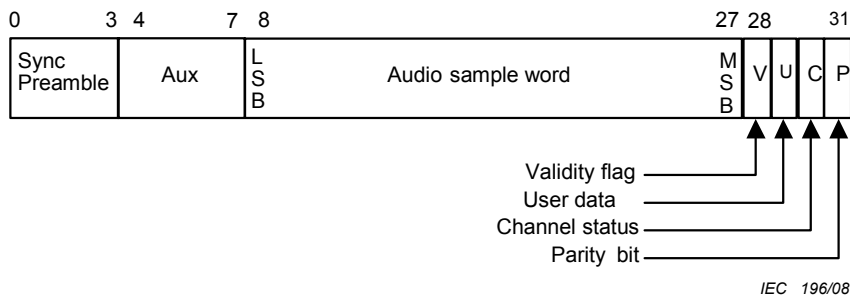


Figure 2 – Sub-frame format

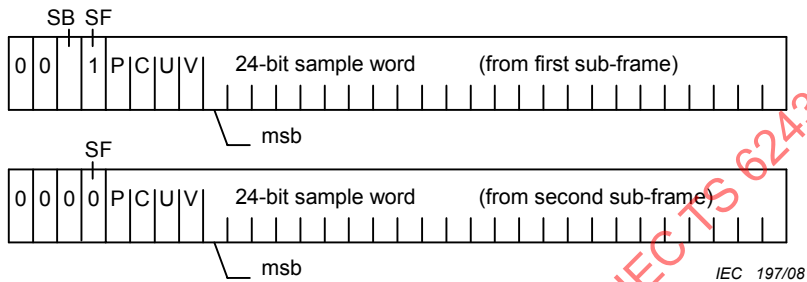
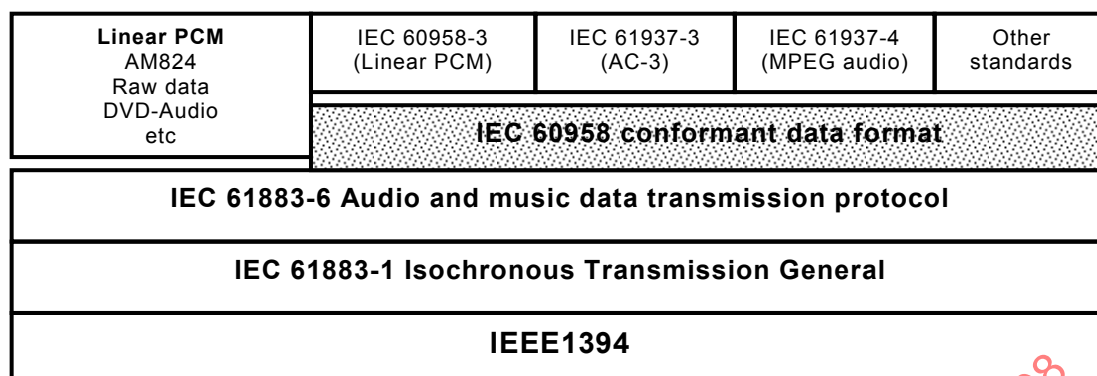


Figure 3 – IEC 60958 conformant data format

Table 2 – IEC 60958 conformant data format

SB (Start of Block) and SF (Start of Frame) definitions				
LABEL	SB	SF	Description	Equivalent IEC 60958 preamble codes
00 ₁₆ - 0F ₁₆	0	0	Second subframe of IEC 60958 frames 0 to 191	W,Y
10 ₁₆ - 1F ₁₆	0	1	First subframe of IEC 60958 frames 1 to 191	M,X
20 ₁₆ - 2F ₁₆	1	0	Reserved	-
30 ₁₆ - 3F ₁₆	1	1	First subframe of IEC 60958 frame 0	B,Z

Figure 4 shows the logical structure of IEC 60958 conformant data format of IEC 61883-6 that enables to transmit all of IEC 60958-1 derivative standards as Figure 1 shows.



IEC 198/08

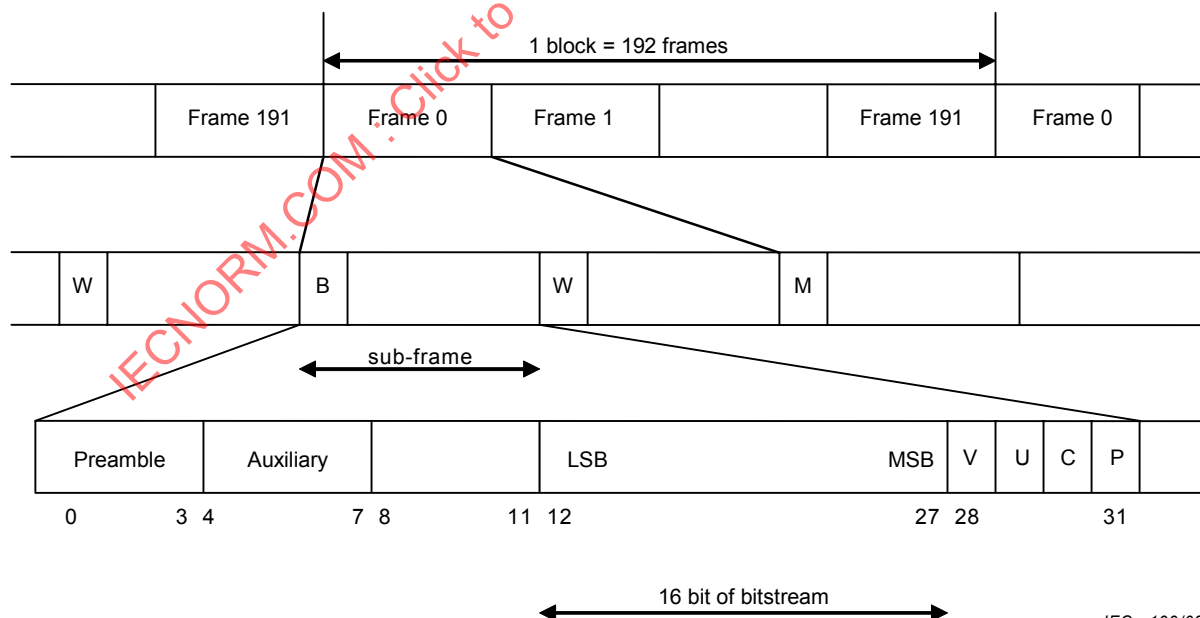
Figure 4 – The logical structure of IEC 60958 conformant data format

4.3.2 Application to the other interface specification

As IEC 61883-6 defines IEC 60958 conformant data format, IEC 60958 conformant data format can be applied to any other interface specifications with the definition of sub-frame, frame and block structure of IEC 60958-1. The other interface specification that applies IEC 60958 conformant data format can transmit all of IEC 60958-1 derivative standards.

4.4 IEC 61937 format based on IEC 60958

IEC 61937-1, clause 5 defines that the interface format as defined in IEC 60958-1 and IEC 60958-3 is used. The non-linear PCM encoded bitstream use every 16 bits data of sub-frame defined in IEC 60958-1 as shown in Figure 5. The bits V, U, C and P are maintained as IEC 60958 defines.



IEC 199/08

Figure 5 – IEC 61937 data area

5 Information for copy control

5.1 Audio

5.1.1 SCMS

IEC 61119-6 specifies SCMS. The status of SCMS is defined in 2 bits of DAT sub-code ID6.

- When ID6 is “00” Copyright status bit set for “not copyright protected”.
- When ID6 is “10” or “11” Copyright status bit set for “copyright protected”.
- The condition “01” in ID6 is not to be used.

A DAT recorder should provide the copyright status in the channel status of digital output. A DAT recorder records digital audio signal from the digital input, the source device should provide a category code with the copyright status bit “L-bit”, and it indicates the “generation status” of the digital audio signal. A DAT recorder detects the copyright status and the category, and controls recording permission and ID6 information referring the schemes defined in IEC 61119-6.

The channel status includes the category code with the copyright status bit “L-bit”, which transmits the generation status of SCMS.

IEC 60958-3 specifies the category codes in the channel status including the category codes that IEC 61119-6 defines. In the channel status, bit 15 is referred to as the “L-bit”.

IEC 60958-3 Annex C describes the implementation for DAT in relation with input source signal category.

IEC 60958-3 does not mention about SCMS but defines category codes with L-bit.

5.1.2 Other information

IEC 61883-6 specifies the ancillary data for CCI in the DVD-Audio adoption layer, but the compliance rule of CCI is not defined, it is defined by another specification, not an IEC standard.

5.2 Video

IEC 61880-2 and IEC 62375 specify CGMS-A copy control information of analogue video signal. In the identification data format, bit 7 and bit 8 of WORD 2 are assigned to CGMS-A. It defines copyright status as follows.

Bit number	7, 8	
	0, 0	Copying is permitted without restriction
	0, 1	Condition not be used
	1, 0	One generation of copies may be made
	1, 1	No copying is permitted

6 Implementation of copy control information of audio

6.1 IEC 61937 implementation

IEC 61937-1 defines that the interface format as defined in IEC 60958-1 and IEC 60958-3 is used. The definition of channel status defined in IEC 60958-3 is applied to all parts of

IEC 61937, as the structure of IEC 61937 is described in 4.4. The category codes defined in IEC 60958-3 is applied to the all parts of IEC 61937.

6.2 IEC 61883-6 implementation

IEC 61883-6 can transmit IEC 60958, IEC 61937 and others with IEC 60958 conformant data format, the channel status is transmitted with IEC 60958 conformant data format as it is. The category codes are transmitted with this structure.

7 Implementation of copy control information of audio accompanied with video

Audio signal accompanied with video is transmitted through IEC 60958-3, IEC 61883-6 and other interfaces. CGMS-A is applied to video signal, the procedure of translation from CGMS-A of video to SCMS of audio accompanied with that video depends on applications and conditions (see Annex B).

8 Implementation of other information

Other information is defined in IEC 60958-3 by channel status and user data, for example sampling frequency, SMPTE time code. This information is transmitted with IEC 61937 and IEC 60958 conformant format.

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Annex A (informative)

Relation between IEC standards and other specifications

The Interface standards of IEC have a relation with the other specifications.

Figure A.1 shows IEC 60958 relation. AES 3 is a standard of AES for professional use, CP-340 is a standard of the former JEITA (EIAJ) for consumer use. The former version of IEC 60958 (1989) originates from AES 3 and CP-340 and is for consumer use. After that IEC 60958 was revised and divided into three parts, as follows:

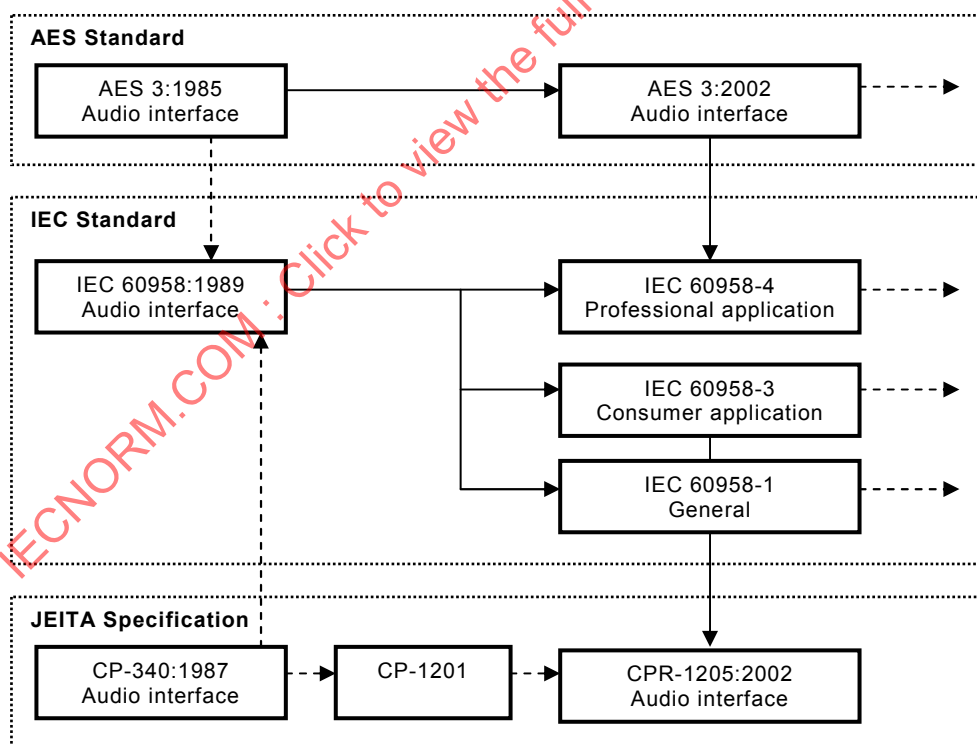
Part 1: General;

Part 3: Consumer applications and

Part 4: Professional applications; Part 4 reflects AES3.

CP-340 was revised to CPR-1201 and both were withdrawn, the latest one is CPR-1205, which is an explanation of IEC 60958 and refers to IEC 60958-1 and IEC 60958-3.

AES 3(2002) version was converted into IEC 60958-4 (2003), the future version of AES 3 will be transformed into the future edition of IEC 60958-4.



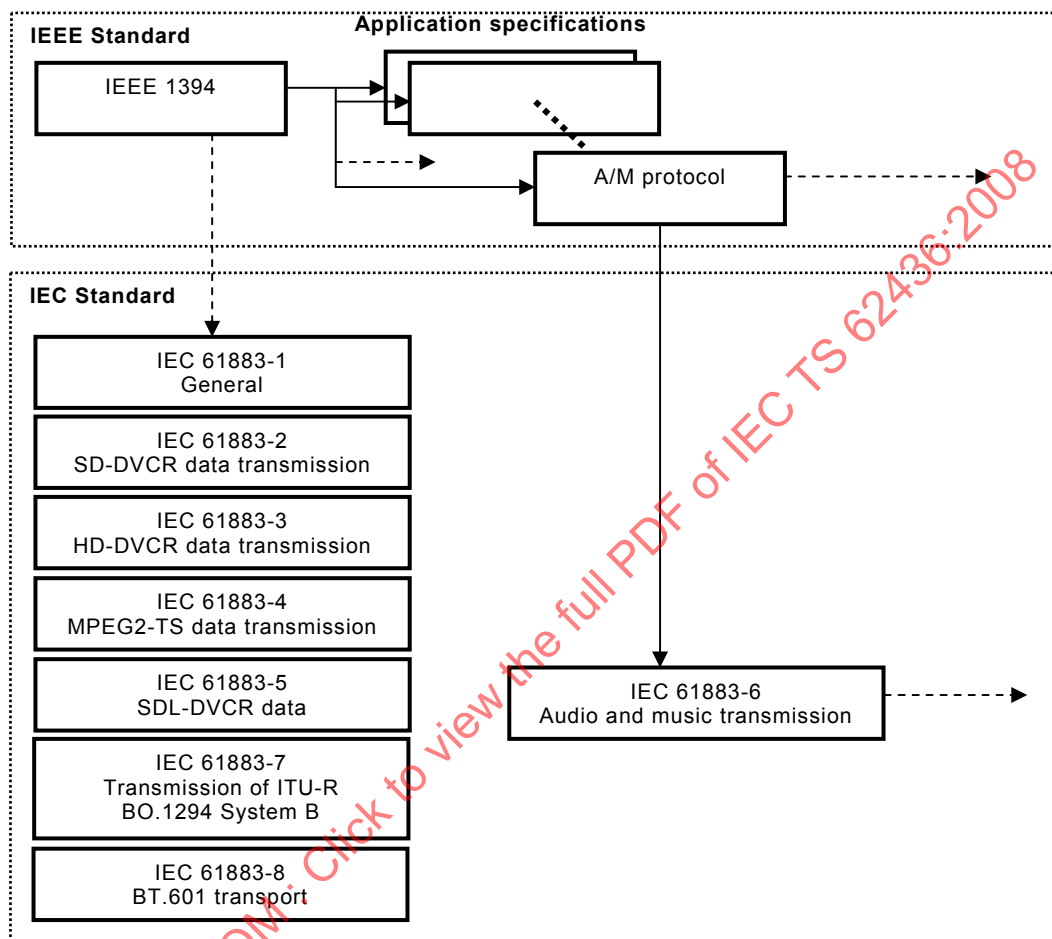
IEC 200/08

Figure A.1 – The relationship between IEC 60958, AES 3 and CP-340

Figure A.2 shows the IEC 61883-6 relation. Application specifications of IEEE 1394 were specified as the IEC 61883 series; Audio and music protocol (A/M Protocol) was specified in

1394 Trade Association (1394TA)¹. It was proposed to IEC as a PAS and became IEC 61883-6. A revision of A/M Protocol is specified by 1394TA, the future version of A/M Protocol is planned as future edition of IEC 61883-6.

Except for part 6, all other parts are mainly digital video interface standards.



IEC 201/08

Figure A.2 – The relationship IEE 1394 and IEC 61883-6

¹ 1394 Trade Association Office, 1560 East Southlake Blvd., Suite 242, Southlake, TX 76092, USA

Annex B

(informative)

Copy control information of audio accompanied with video

Video contents have its audio contents. Audio, video and multimedia equipment such as DVD-Video player outputs video signal, audio signal and information. The copyright control scheme of the video contents is CGMS-A or the other more complex schemes. This scheme will cover the audio contents that are accompanied with the video contents.

The copyright control method and information that should be applied to the audio signal that is output from the video equipment depends on the video format and its copy control schemes. For instance, DVD-Video format employs its own copy control system that defines the restriction to the digital audio interface.

Copyright control of digital audio interface is classified as follows.

- SCMS is applied.
- CGMS-A is applied.
- Other copy control scheme is applied.
- No output of audio signal.

IEC standards are applicable to SCMS and CGMS-A cases, another specification would be applied to the other cases.

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