

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Digital audio interface –
Part 5: Consumer application enhancement
ITeH STANDARD PREVIEW
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Interface audionumérique –
Partie 5: Amélioration de l'application grand public
IEC 60958-5:2021
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Digital audio interface –
Part 5: Consumer application enhancement

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DIGITAL AUDIO INTERFACE –

Part 5: Consumer application enhancement

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The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3449/CDV	100/3517/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 60958 series, published under the general title *Digital audio interface*, can be found on the IEC website.

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

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- replaced by a revised edition, or
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INTRODUCTION

IEC 60958-3 edition 1.0 was released in 1999 specifying the consumer applications of the interface for the inter-connection of digital audio equipment defined in IEC 60958-1. The applications have enhanced their quality including multichannel modes, high-precision bit length, and multi-stream modes. These enhancements imply a new part in the IEC 60958 series, appropriately keeping backward compatibility with IEC 60958-3 and providing a new enhanced digital audio interface.

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DIGITAL AUDIO INTERFACE –

Part 5: Consumer application enhancement

1 Scope

This part of IEC 60958 enhances the consumer application of the interface for the interconnection of digital audio equipment defined in IEC 60958-1 and IEC 60958-3, introducing:

- multichannel;
- multi-stream;
- high-resolution;
- multimedia extension;
- related applications.

NOTE IEC 60958-3 specifies a consumer application to carry stereophonic programmes with a resolution of up to 24 bits per sample. This part of IEC 60958 enhances the application, allowing programmes with up to 64 channels, 64 bits per sample, and two simultaneous streams.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

<https://standards.iteh.ai/catalog/standards/sist/8bc4aa34-aa1e-4373-b326-9a032843005b/iec-60958-5-2021>

IEC 60958-1:20—1, *Digital audio interface – Part 1: General*

IEC 60958-3:20—2, *Digital audio interface – Part 3: Consumer applications*

IEC 62574:2020, *Audio, video and multimedia systems – General channel assignment of multichannel audio*

ISO/IEC 23001-8:2016, *Information technology – MPEG systems technologies – Part 8: Coding-independent code points*³

ITU-R BS.2094-1:2017, *Common definitions for the audio definition model*

ITU-R BS.2051-2:2018, *Advanced sound system for programme production*

¹ Under preparation. Stage at the time of publication: IEC CCDV 60958-1:2021.

² Under preparation. Stage at the time of publication: IEC CCDV 60958-3:2021.

³ This publication was withdrawn and replaced with ISO/IEC 23091-3:2018, ISO/IEC 23091-1:2018 and ISO/IEC 23091-2:2019.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

one-bit audio

one-bit length audio data stream

Note 1 to entry: A one-bit audio data stream can be directly played back through the analogue low-pass filter bit by bit (MSB first).

3.2

high-precision multi-bit linear audio

linear PCM audio data longer than 25 bits length per sample

Note 1 to entry: This document supports 32- and 64-bit lengths.

3.3

sampling frequency

frequency of the samples representing an audio signal.

Note 1 to entry: When more than one signal is transmitted through the same interface, the sampling frequencies are identical.

[SOURCE: IEC 60958-1:20—, 3.1]

[IEC 60958-5:2021](https://standards.iteh.ai/catalog/standards/sist/8bc4aa34-aa1e-4373-b326-9a032843005b/iec-60958-5-2021)

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3.4

audio sample word

value of a digital audio sample

Note 1 to entry: Representation is linear in 2's complement binary form.

Note 2 to entry: Positive numbers correspond to positive analogue voltages at the input of the analogue-to-digital converter (ADC).

[SOURCE: IEC 60958-1: 20—, 3.2]

3.5

channel status

data carrying, in a fixed format, information associated with each main data field channel, which is decodable by any interface user.

Note 1 to entry: IEC 60958-3 specifies the mode 0 channel status format for digital audio equipment for consumer use.

EXAMPLE 1 Length of audio sample words.

EXAMPLE 2 Sampling frequency.

[SOURCE: IEC 60958-1:20—, 3.5, modified – Modification of the Note to entry, and addition of two examples.]

3.6

preamble

specific patterns used for synchronization.

Note 1 to entry: There are three different preambles: “B”; “M”; and “W”.

[SOURCE: IEC 60958-1:20—, 3.8, modified – Modification of the Note to entry.]

3.7

sub-frame

fixed structure used to carry information

[SOURCE: IEC 60958-1:20—, 3.9]

3.8

frame

sequence of two successive and associated sub-frames

[SOURCE: IEC 60958-1:20—, 3.10]

3.9

block

group of 192 consecutive frames

Note 1 to entry: The start of a block is designated by a special sub-frame preamble.

[SOURCE: IEC 60958-1:20—, 3.11]

3.10

channel number

number that shows channel order in two-channel operation mode

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3.11

channel label ID

label of ID

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[SOURCE: IEC 62574:2020, 3.73]

3.11.1

multichannel number

number that identifies multichannel addressing

Note 1 to entry: Same as IEC 62574 channel number

3.12

multichannel group

group composed of one or two multichannel subgroups

3.13

multichannel count

count of channels in a multichannel group

3.14

multichannel subgroup

subgroup, in a multichannel group, composed of several multichannel

Note 1 to entry: Multichannel subgroup A is set according to multichannel configuration.

Note 2 to entry: Multichannel subgroup B is set according to multichannel map.

3.15

multichannel configuration

configuration of multichannel addressing

3.16

multichannel order

order of multichannel in a multichannel group

3.17

multichannel map

map of multichannel selections

4 Interface format

The interface format as defined in IEC 60958-1 and IEC 60958-3 shall be used unless otherwise specified in this document.

5 Operation modes

5.1 General

IEC 60958-1 specifies single- and two-channel operation modes. This document introduces several new operation modes based on the same interface format of IEC 60958-1 without the pre-emphasis function defined in IEC 60958-3. Channel status information identifies these modes in operation. This document shares the information with IEC 60958-1 and IEC 60958-3 and specifies new usages.

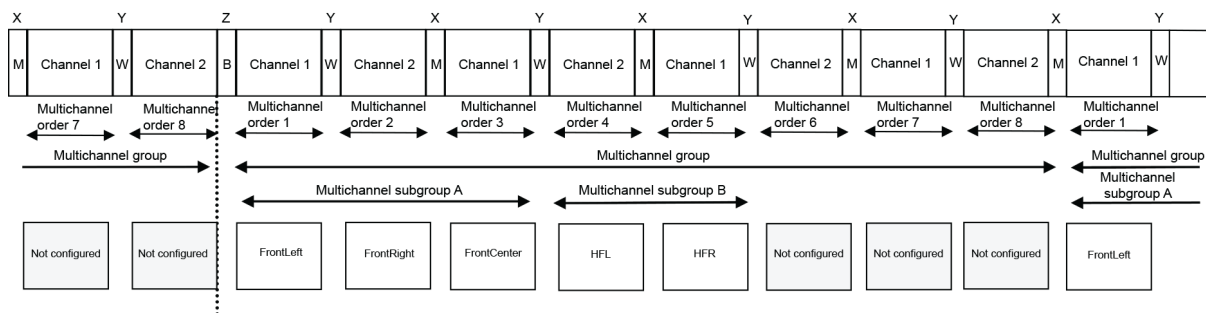
5.2 Multichannel linear PCM operation mode

In multichannel linear PCM operation mode, the samples taken from multichannel linear PCM are transmitted by time multiplexing in consecutive sub-frames.

[IEC 60958-5:2021](#)

A multichannel group is composed of several multichannel by consecutive frames. The number of multichannels included in the group is identified by the multichannel count of channel status bits 44 to 47. The group starts with preamble “B” and repeats itself with no break in the block and without un-grouped frames. The group is divided into one or two multichannel subgroups by the multichannel configuration of channel status bits 49 to 60 and the multichannel map of channel status bits 64 to 165. The subgroup is composed of some specific multichannels by consecutive sub-frames. Each multichannel within the multichannel subgroup B is re-numbered according to the multichannel number of channel status bits 64 to 165. Each channel carries consecutive audio sample words.

An example is shown in Figure 1 and Table 1. The multichannel group is composed of eight multichannels. This number of eight is identified by the multichannel count value of “1110”. The multichannel subgroup A is composed of three multichannels identified by the multichannel configuration value of “100001010000”, which includes FrontLeft channel, FrontRight channel and FrontCenter channel given in ITU-R BS.2094-1. The multichannel subgroup B is composed of the 77th multichannel (channel label ID name of HFL) and 78th multichannel (channel label ID name of HFR) by setting the channel status bit 77 to “1” and the channel status bit 78 to “1”. Channels of multichannel order 6, 7 and 8 are not used in this example.



IEC

Figure 1 – Example: multichannel group and subgroups

The sampling frequency of each audio multichannel is identical and identified by the original sampling frequency of channel status bits 36 to 39. The sampling frequency of channel status bits 24 to 27, 30 and 31 identifies the IEC 60958 frame rate in operation.

Table 1 – Example: multichannel group and subgroups

Preamble	Channel number	Multichannel order	Multichannel subgroup A	Multichannel subgroup B
			ITU-R BS.2094-1; audioPackFormatID, audioChannelNames	Multichannel map C-Bit 64-191; Multichannel number value: Channel label ID name
B	1	1	AP_0001000a FrontLeft	
W	2	2	FrontRight	
M	1	3	FrontCenter	
W	2	4		77: HFL
M	1	5		78: HFR
W	2	6		
M	1	7		
W	2	8		
M	1	1	AP_0001000a FrontLeft	
W	2	2	FrontRight	
M	1	3	FrontCenter	
W	2	4		77: HFL
M	1	5		78: HFR
W	2	6		
M	1	7		
W	2	8		
M	1	1	AP_0001000a	
⋮	⋮	⋮	⋮	⋮
M	1	7		
W	2	8		
B	1	1	AP_0001000a FrontLeft	
M	2	2	FrontRight	
W	1	3	FrontCenter	

5.3 One-bit audio operation mode

In one-bit audio operation mode, the samples taken from multichannel one-bit audio stream are transmitted by time multiplexing in consecutive sub-frames. The sub-frame format is shown in Figure 2.

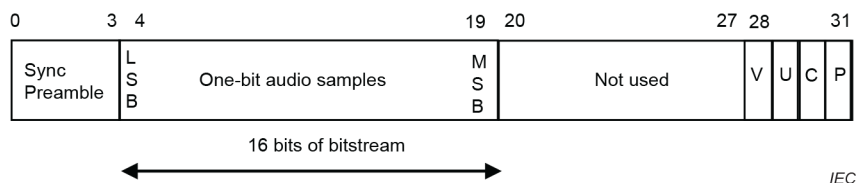


Figure 2 – One-bit audio subframe

Time slots 4 to 19 carry on-bit audio samples composed of 16 bits of the consecutive one-bit audio stream. Significant bit (MSB) is carried by time slot 19.

Time slots 20 to 17 are not used; they are filled with zeros or a few fixed patterns and ignored.

The frame format as defined in multichannel linear PCM operation mode is used for multichannel one-bit audio operation mode.

The sampling frequency of each one-bit audio channel is identical and identified by the original sampling frequency of the channel status bits 36 to 39, which is 16 multiples of that of the multichannel linear PCM. The sampling frequency of channel status bits 24 to 27, 30 and 31 identifies the IEC 60958 frame rate in operation. IEC 60958-3 defines the original sampling frequency where one-bit audio multiples 16 and sampling frequency as the IEC 60958 frame rate.

5.4 High-precision multi-bit linear audio operation mode

In the high-precision multi-bit linear audio operation mode, the samples taken from the multichannel high-precision multi-bit linear audio are transmitted by time multiplexing in consecutive sub-frames dividing of word. The sub-frame format of 32/64-bit mode is shown in Figure 3. The frame formats are shown in Figure 4 and Figure 5.

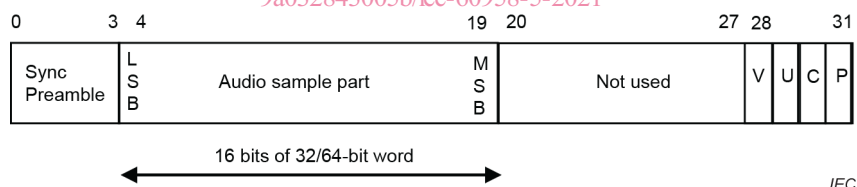


Figure 3 – 32/64-bit mode subframe

In 32-bit audio operation mode, time slots 4 to 19 carry 16-bit samples of 32-bit audio words. Significant bit (MSB) is carried by time slot 19. Time slots 20 to 17 are not used; they are filled with zeros or a few fixed patterns and ignored.

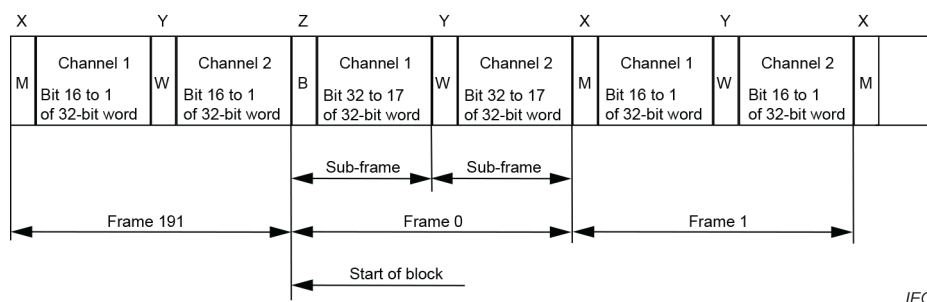


Figure 4 – 32-bit mode frame

The frame format as defined in the multichannel linear PCM operation mode is used for multichannel 32-bit operation modes.