

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Transmission of audio and/or video and related signals using infrared radiation –  
Part 8-1: Digital audio and related signals

Transmission de signaux audio et/ou vidéo et de signaux similaires par rayonnement infrarouge –  
Partie 8-1: Signaux audio numériques et similaires

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## TRANSMISSION OF AUDIO AND/OR VIDEO AND RELATED SIGNALS USING INFRARED RADIATION –

### Part 8-1: Digital audio and related signals

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This part of IEC 61603 replaces 6.8.3 of IEC 61603-2.

This bilingual version, published in 2011-04, corresponds to the English version.

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

FDIS	Report on voting
100/628/FDIS	100/706/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.

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# TRANSMISSION OF AUDIO AND/OR VIDEO AND RELATED SIGNALS USING INFRARED RADIATION –

## Part 8-1: Digital audio and related signals

### 1 Scope

This part of IEC 61603 specifies the characteristics and measuring methods for digital audio signal transmission systems using infrared radiation with sub-carrier of the frequency ranges 3 MHz to 6 MHz. It describes systems with different economic uses of the available bandwidth in order to obtain minimum interference and maximum compatibility.

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

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

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

IEC 61603-1:1997, *Transmission of audio and/or video and related signals using infra-red radiation – Part 1: General*

IEC 61603-2:1997, *Transmission of audio and/or video and related signals using infra-red radiation – Part 2: Transmission systems for audio wide band and related signals*

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

IEC 61938, *Audio and audiovisual systems – Interconnections and matching values – Preferred matching values of analogue signals*

### 3 Terms, definitions and abbreviations

#### 3.1 Terms and definitions

For the purposes of this part of IEC 61603, the definitions given in Part 1 together with the following apply.

##### 3.1.1

##### **source stream**

source\_block stream with a corresponding source\_info stream and transmission\_info stream

##### 3.1.2

##### **block\_structure**

structure of data and parties for transmission

**3.1.3****Tr\_section**

interleaved stream from the block\_structure

**3.2 Abbreviations**

For the purposes of this part of IEC 61603, the following abbreviations apply.

IR	infrared (see IEC 61603-1)
PD	photo diode
O/E	optical/ electrical
Tx	transmitter/ radiator
Rx	receiver
QPSK	quadrature phase shift keying
DQPSK	differential encoded QPSK
Transmission_info	transmission information
CRC	cyclic redundancy check
source_info	source information
Sync Gen.	sync pattern generator
Header Gen.	header generator
GF	galois field
RS	Reed-Solomon code
ECC	error correction code

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**4 System description****4.1 General**

This part of 61603 defines an application using digital audio signals based on the digital audio interface, IEC 60958, for professional and consumer applications. This includes an ability to transmit non-linear PCM data formatted according to IEC 61937.

The digital audio bitstream transmission systems that are the subject of this document are characterized by the following features:

- used for interface with infrared radiation,
- harmonized with IEC 60958;
- harmonized with IEC 61937;
- used for multi-channel transmission in future;
- signal block structure;
- error correction;
- frequency range: 3 MHz to 6 MHz;
- channel coding;
- low spurious (band-pass filter).

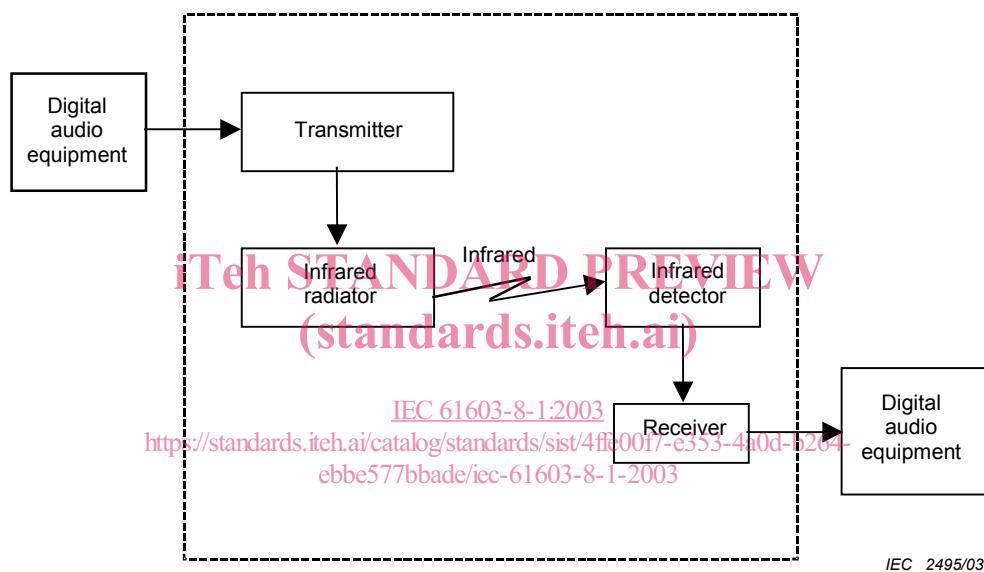
This standard gives the detailed specifications of the digital audio signal transmission. Infrared digital audio signal transmission is used in a frequency range of 3 MHz to 6 MHz as specified in IEC 61603-2. It shares this range with analogue audio applications, so that care should be taken to avoid interference with any such applications being used simultaneously.

This system supports a full-band mode that carries all the data on the IEC 60958 interface at sample rates of 48 kHz and below. It also supports a half-band mode carrying two streams each of two 16-bit audio channels without the capacity for all the associated validity data, user data, or channel status data defined in IEC 60958. Some of those data are carried elsewhere in the system.

Depending on the applicable bit rate, two different channel bandwidths are possible. One is called the full-band mode, which carries 2 channels, 32-slot bit stream with the bandwidth of 3 MHz wide, the other is called the half-band mode, which carries 2 channels, 16-slot bit stream with the bandwidth of 1,5 MHz wide.

Both the full-band mode and half-band mode are based on IEC 60958-1, IEC 60958-3, IEC 60958-4 and IEC 61937.

The system concept is shown in Figure 1.



**Figure 1 – System concept**

## 4.2 Area of application

This digital audio signal transmission system using infrared radiation is mainly used for transmitting digital audio signals from a CD player, DAT player or MD player, etc. to headphones, speakers and infrared receivers, etc.

## 4.3 Band allocation

In IEC 61603-2, the band allocation for high quality audio transmission ranges from 2 MHz to 6 MHz is as shown in Figure 2.

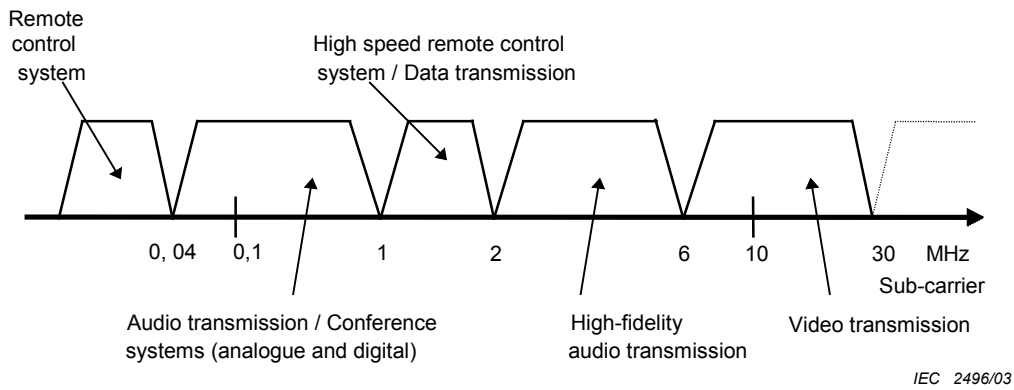


Figure 2 – IEC 61603 band allocation

There are 8 channels in this band, named H1 through H8, for analogue audio signals, as defined in Table 1.

In general, wireless loudspeaker or wireless headphone systems use H1 and H2 for left and right channels, so this format for digital audio uses channel allocation from H3 to H8.

Table 1 – Analogue audio channel allocation

Name	Sub-carrier
H1	2,3 MHz
H2	2,8 MHz
H3	3,2 MHz
H4	3,7 MHz
H5	4,3 MHz
H6	4,8 MHz
H7	5,2 MHz
H8	5,7 MHz

Figure 3 shows the channel allocation for this digital audio format together with analogue channel allocation.

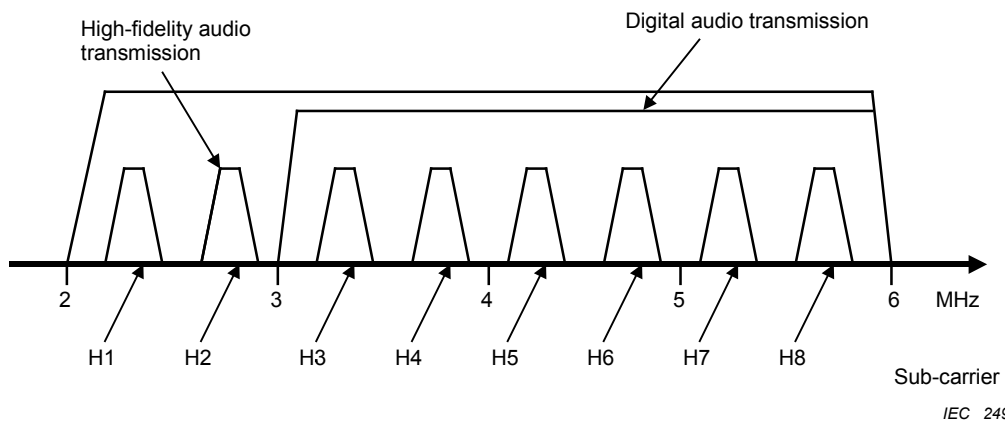


Figure 3 – Band allocation

## 5 General characteristics

### 5.1 Environment conditions for operation

The environmental conditions for the equipment are mainly defined in relevant standards for individual units. However, unless otherwise specified, the equipment shall be capable of operating at least within the temperature and relative humidity ranges:

5 °C to 40 °C, and 25 % RH to 75 % RH

Systems and apparatus in accordance with this standard are primarily used indoors, with the advantage of operating more than one system interference-free in adjacent rooms.

### 5.2 Partition of functions between elements of the systems

Due to the different applications for different room sizes, equipment is designed in various combinations of functional blocks. For home applications it is desirable to have only a few blocks of small size and low installation cost.

## 6 Specific requirements

### 6.1 Block diagram

Figure 4 shows a block diagram of the transmitter described in Figure 1. Figure 5 shows a block diagram of the channel-coding block. The signal from sync gen., header gen. and Tr\_section are multiplexed into the transmission stream.

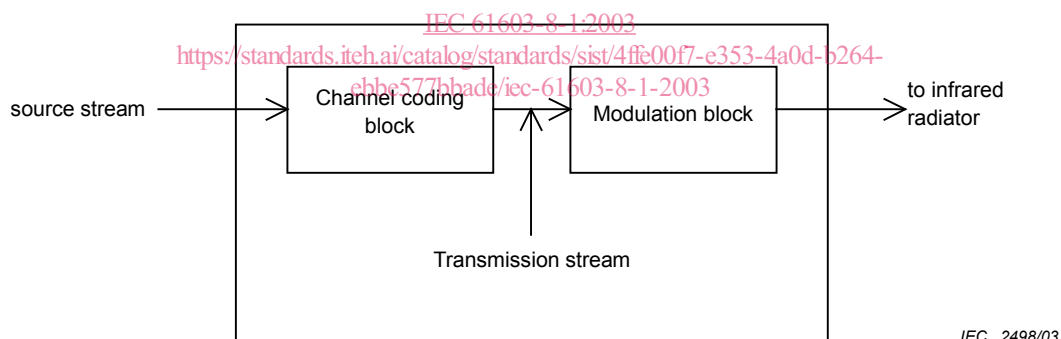
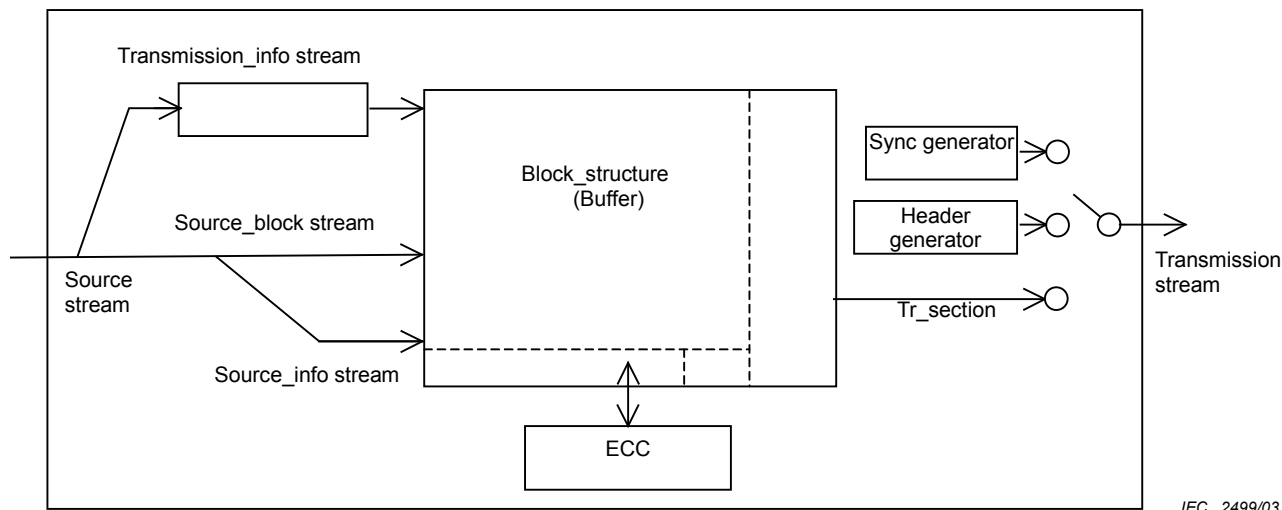


Figure 4 – Transmitter



IEC 2499/03

Figure 5 – Channel-coding block

**6.2 Input and output**

The digital audio signals at input and output shall be in accordance with IEC 61938.

**6.3 Carrier**

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The carrier shall use infrared (wavelengths between 800 nm and 900 nm).

**6.4 Sub-carrier**

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The sub-carrier modulates the carrier of infrared. In this format, the sub-carrier band ranges from 3 MHz to 6 MHz.

**6.5 Channel allocation**

**6.5.1 General**

Figure 6 shows the channel allocation of digital audio signal transmission using infrared radiation, with the frequencies of each sub-carrier. The signal has a dual modulation. The infrared signal is intensity-modulated by the sub-carrier, which is DQPSK-modulated with the digital audio signals.

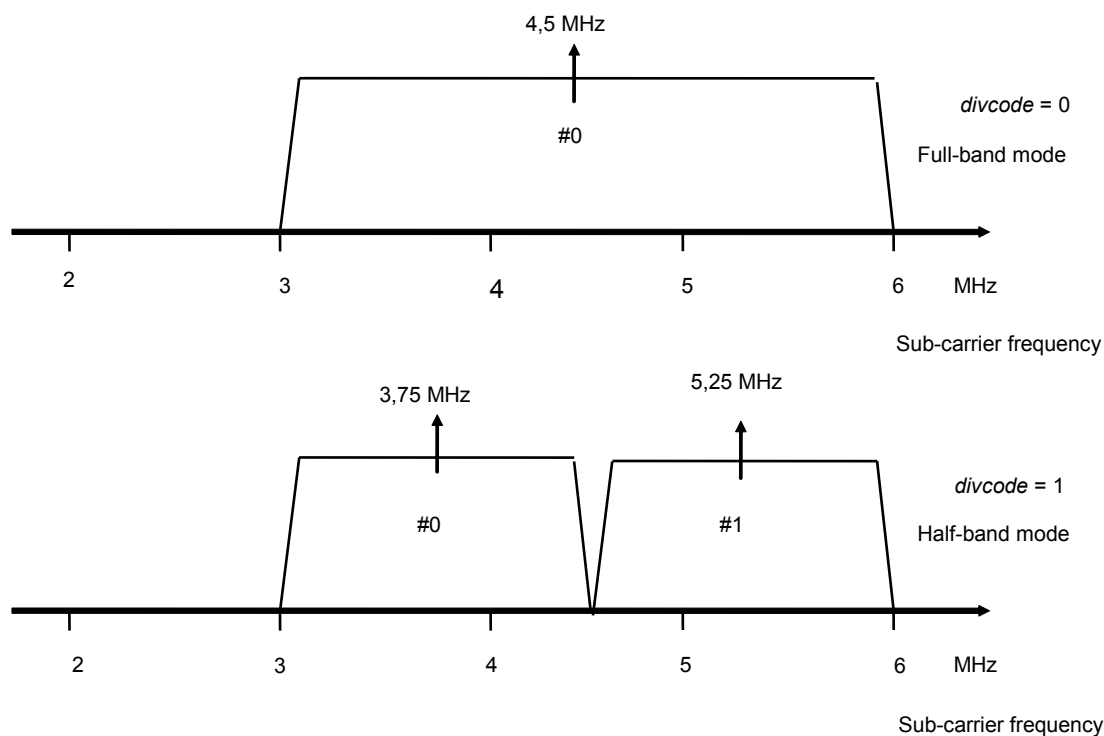
**6.5.2 Sub-carrier frequency**

Table 2 shows the values of sub-carrier frequency.

Table 2 – Sub-carrier frequency

divcode	Number of channels	$f_{sub-carrier}$ MHz
0	1	4,5
1	2	3,75 5,25

Figure 6 shows two kinds of transmission channel allocation.



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Figure 6 – Channel allocation

### 6.5.3 Bit rate

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The maximum source stream bit rate is shown in Table 3.

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Table 3 – Maximum source stream bit rate

divcode	Rate	Number of channels
0	3,072 Mbps	1
1	1,536 Mbps	2

For reference, Table 4 shows bit rate of digital audio.

Table 4 – Bit rate of digital audio

Bit rate	Digital audio signal
3,072 Mbps	48 kHz, 32 bit, 2 ch
1,536 Mbps	48 kHz, 16 bit, 2 ch
2,8224 Mbps	44,1 kHz, 32 bit, 2 ch
1,4112 Mbps	44,1 kHz, 16 bit, 2 ch
2,048 Mbps	32 kHz, 32 bit, 2 ch
1,024 Mbps	32 kHz, 16 bit, 2 ch