

Transmission of audio and/or video and related signals using infrared radiation —

Part 8-1: Digital audio and related signals

The European Standard EN 61603-8-1:2004 has the status of a
British Standard

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National foreword

This British Standard is the official English language version of EN 61603-8-1:2004. It is identical with IEC 61603-8-1:2003. It partially supersedes BS EN 61603-2:1997.

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English version

**Transmission of audio and/or video and related signals
using infrared radiation
Part 8-1: Digital audio and related signals
(IEC 61603-8-1:2003)**

Transmission de signaux audio
et/ou vidéo et de signaux similaires
au moyen de rayonnement infrarouge
Partie 8-1 : Signaux audio numérique
et similaires
(CEI 61603-8-1:2003)

Übertragung von Ton- und/oder
Bildsignalen und verwandten Signalen
mit Infrarotstrahlung
Teil 8-1: Digitale Audiosignale
und zugeordnete Signale
(IEC 61603-8-1:2003)

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CENELEC

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

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Foreword

The text of document 100/628/FDIS, future edition 1 of IEC 61603-8-1, prepared by 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 61603-8-1 on 2004-04-01.

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Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61603-8-1:2003 was approved by CENELEC as a European Standard without any modification.

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TRANSMISSION OF AUDIO AND/OR VIDEO 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 infrared radiation – Part 1: General*

IEC 61603-2:1997, *Transmission of audio and/or video and related signals using infrared 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

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.

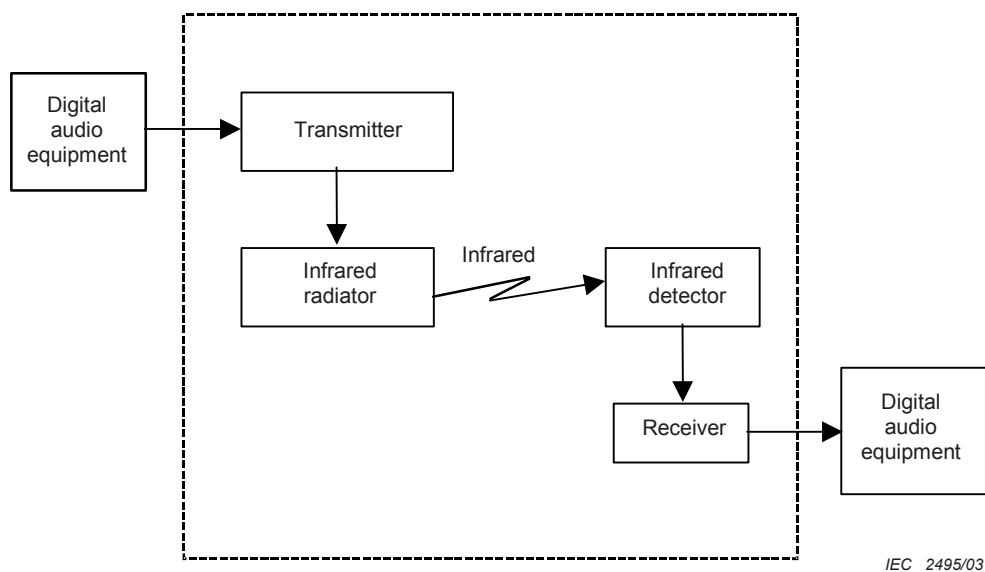


Figure 1 – System concept

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.

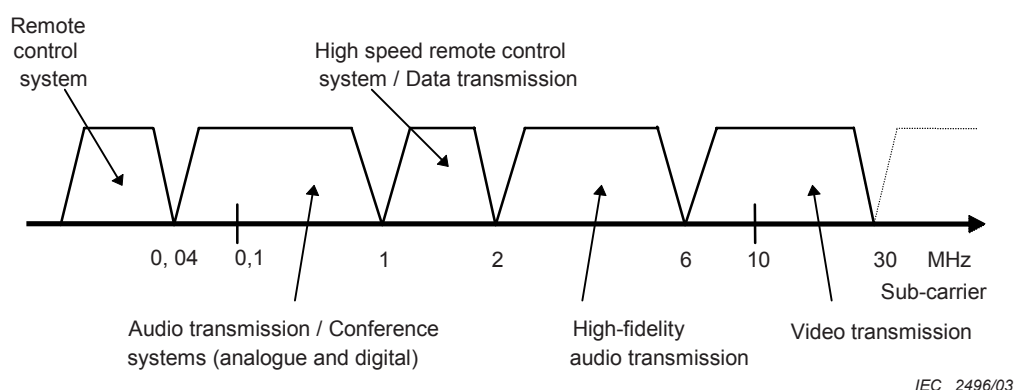


Figure 2 – IEC 61603 band allocation

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.

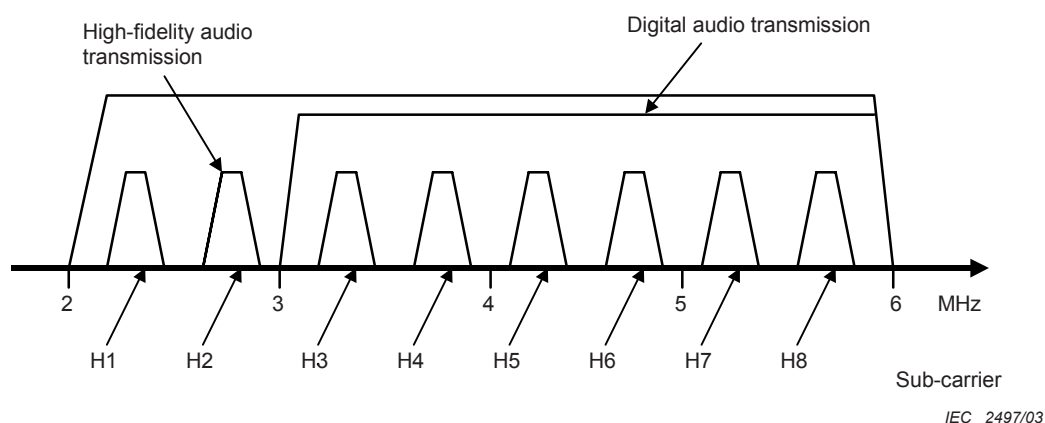


Figure 3 – Band allocation

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.

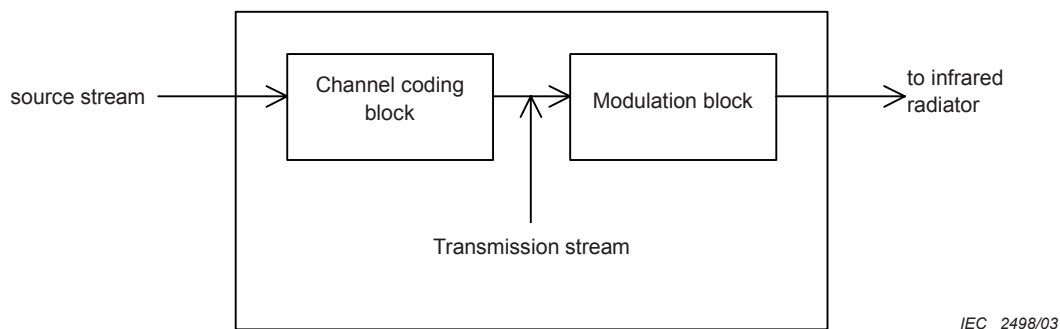


Figure 4 – Transmitter

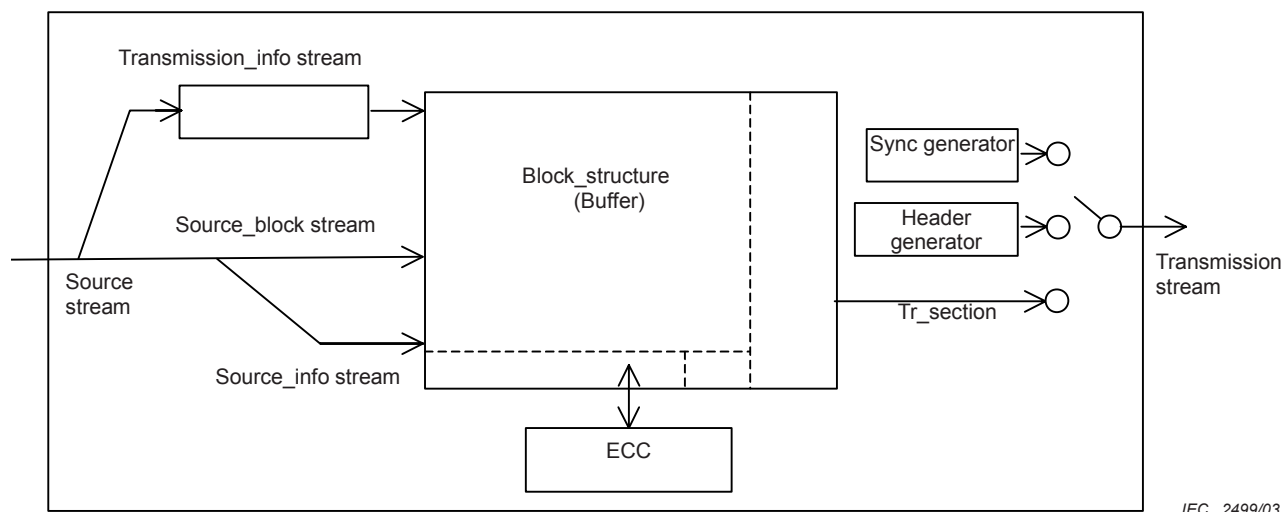


Figure 5 – Channel-coding block

6.2 Input and output

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

6.3 Carrier

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

6.4 Sub-carrier

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	$f_{\text{sub-carrier}}$ MHz
0	1	4,5
1	2	3,75 5,25

Figure 6 shows two kinds of transmission channel allocation.

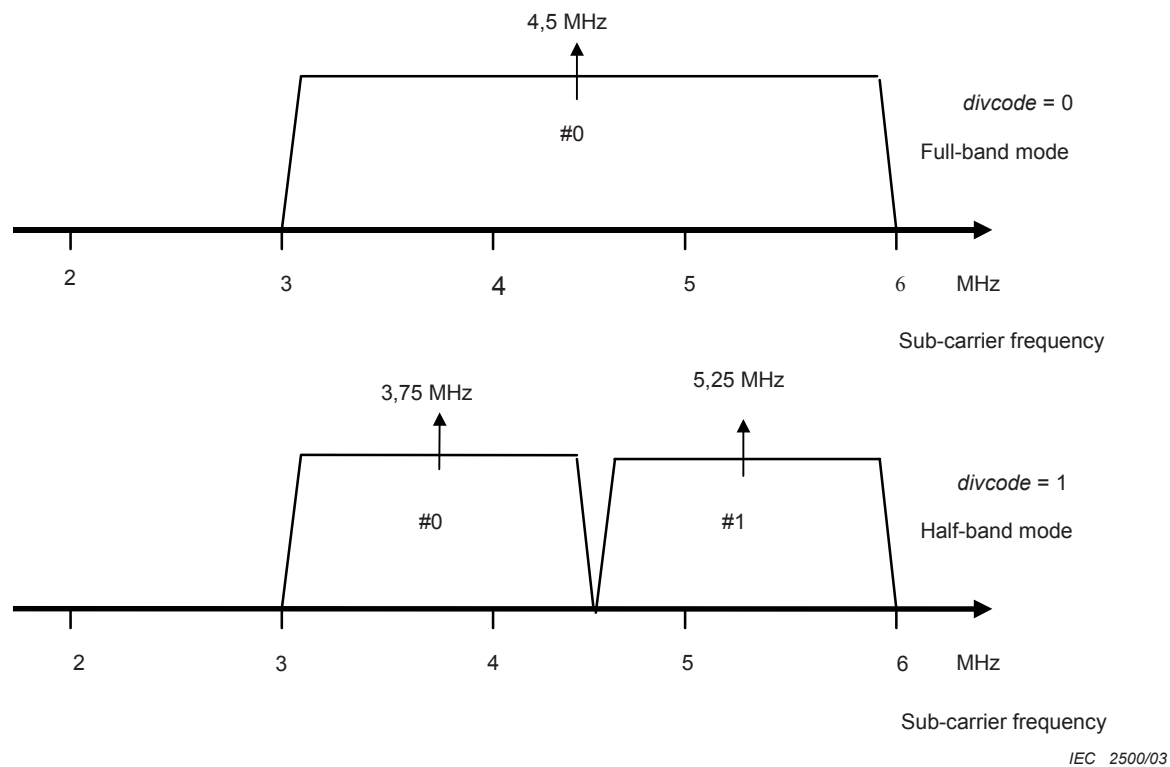


Figure 6 – Channel allocation

6.5.3 Bit rate

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

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

6.6 Block structure

“Source stream” to “Tr_section” conversion is based on the block structure in Figure 7. Each symbol in this structure has a size of 1 byte.

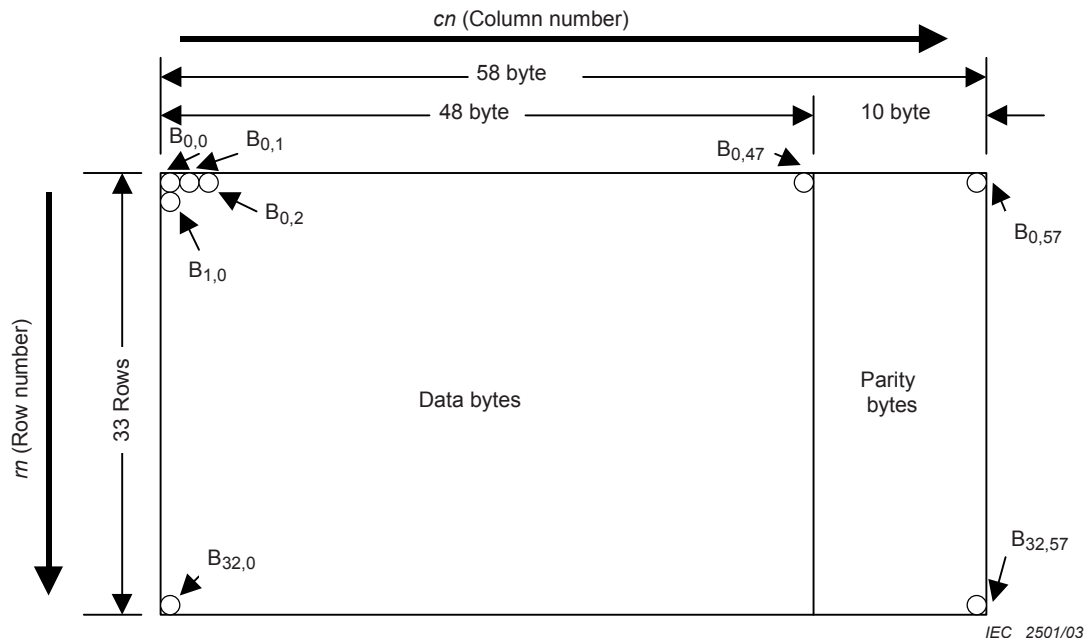


Figure 7 – Block structure

A byte in Figure 7 is defined as:

$$B_{rn,cn}$$

where

rn is the row number

cn is the column number

In Figure 7, left-upper corner is byte $B_{0,0}$ and right-lower corner is byte $B_{32,57}$.

6.7 Source stream

6.7.1 General

“Source stream” consists of a “source_block stream” with a corresponding “source_info stream” and a “transmission_info stream.”

As shown in Figure 8, the “source_block stream”, “source_info stream” and “transmission_info stream” are simultaneous.

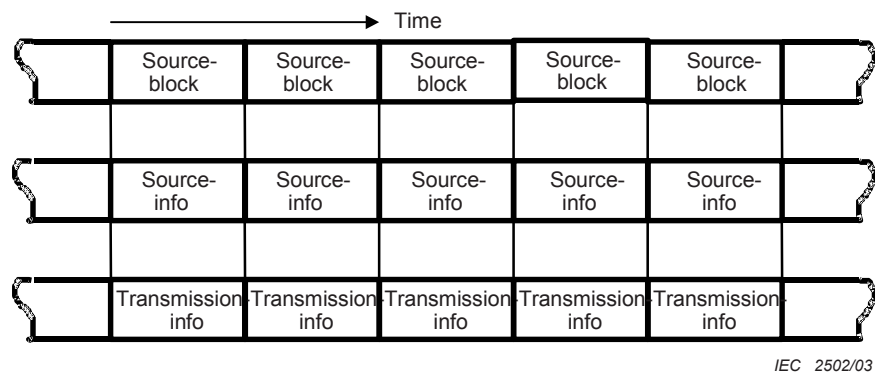


Figure 8 – Source stream

6.7.2 Source_block stream

The data clock frequency of the “source_block stream” should be a multiple of one of

- 48 kHz
- 44,1 kHz
- 32 kHz

For example, the clock is 44,1 kHz × 32, when transmitting CD audio.

The “source_block stream” is composed of a series of continuous “source_blocks”, each of which consists of 1 536 bytes .

The format of the “source_block” is defined in Annexes A and B.

Figure 9 shows this format.

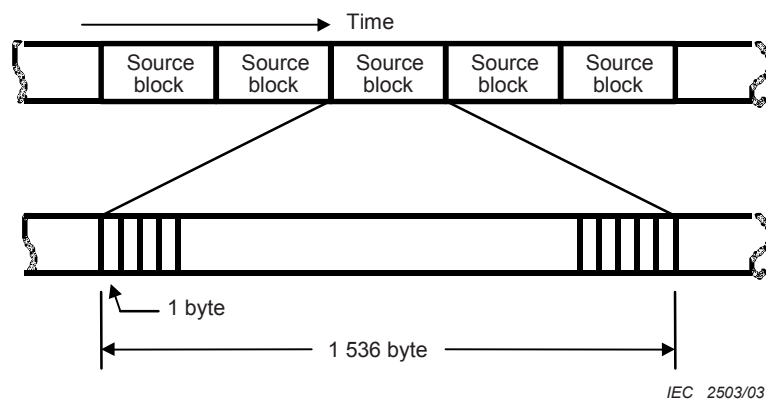


Figure 9 – Source_block stream

The order of each byte in the “source_block” is shown as follows:

$$B_{0,0} \ B_{0,1} \ B_{0,2} \ \dots \ B_{0,47} \ B_{1,0} \ B_{1,1} \ \dots \ B_{31,47}$$

6.7.3 Source_info stream

The “source_info stream” is composed of a continuous source_info made up from 40 bytes.

The format of “source_info” is defined in Annexes A and B.

Figure 10 shows the format of the “source_info stream.”

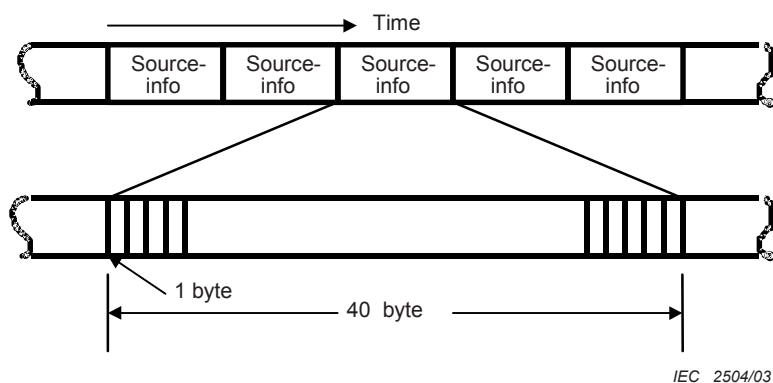


Figure 10 – Source_info stream

The order of each byte in the “source_info” is shown as follows:

$B_{32,0}$ $B_{32,1}$ $B_{32,2}$... $B_{32,38}$ $B_{32,39}$

6.7.4 Transmission_info stream

“Transmission_info stream” is composed of a continuous “transmission_info” made up from 8 bytes.

Each byte of “transmission_info” is defined in Table 5.

Table 5 – Byte values in a transmission_info

B32.cn	Default value	Meaning
40	0	Reserved
41	0	Reserved
42	0	Reserved
43	0	Reserved
44	0	Reserved
45	0	Reserved
46-47	–	SectionID

SectionID is a serial number, modulo 0x10 000 (65 536), incremented at each “source_block” to show the serial number of the “source_block.”

6.7.5 Block alignment

Figure 11 shows alignment of the “source_block”, “source_info”, and “transmission_info” in the “block-structure.”