

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Consumer audio/video equipment – Digital interface –  
Part 4: MPEG2-TS data transmission

Matériel audio/vidéo grand public – Interface numérique –  
Partie 4: Transmission de données MPEG2-TS

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**CONSUMER AUDIO/VIDEO EQUIPMENT –  
DIGITAL INTERFACE –****Part 4: MPEG2-TS data transmission**

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International Standard IEC 61883-4 has been prepared by technical area 4: Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition of IEC 61883-4 cancels and replaces the first edition published in 1998. This edition contains the following significant technical changes with respect to the previous edition:

Updated IEC 61834-9, IEC 61834-10 and added IEC 61834-1 in Bibliography.

This bilingual version (2013-02) corresponds to the monolingual English version, published in 2004-08.

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

CDV	Report on voting
100/729/CDV	100/818/RVC

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

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 61883 consists of the following parts under the general title *Consumer audio/video equipment – Digital interface*:

Part 1: General

Part 2: SD-DVCR data transmission

Part 3: HD-DVCR data transmission

Part 4: MPEG2-TS data transmission

Part 5: SDL-DVCR data transmission

Part 6: Audio and music data transmission protocol

Part 7: Transmission of ITU-R BO.1294 System B

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# CONSUMER AUDIO/VIDEO EQUIPMENT – DIGITAL INTERFACE –

## Part 4: MPEG2-TS data transmission

### 1 Scope

This part of IEC 61883 describes the packetization and the transmission timing for MPEG2 transport streams for the IEEE 1394 digital interface. It describes the specifications for the IEEE 1394 packet, the CIP header and the transmission timing for use with the transport stream as specified in prETS 300 468. This explanation is based on the transport stream as specified in DVB.

### 2 Normative reference

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 61883-1, *Consumer audio/video equipment – Digital interface – Part 1: General*

ISO/IEC 13818-1, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

ISO/IEC 13818-2, *Information technology – Generic coding of moving pictures and associated audio information: Video*

ISO/IEC 13818-3, *Information technology – Generic coding of moving pictures and associated audio information – Part 3: Audio*

ISO/IEC 13818-9, *Information technology – Generic coding of moving pictures and associated audio information – Part 9: Extension for real time interface for system decoders*

prETS 300 468, *Digital broadcasting systems for television, sound and data services – Specification for Service Information (SI) in digital video broadcasting (DVB) systems*

### 3 Terms, definitions, and abbreviations

For the purposes of this document, the following abbreviations apply:

CIP	Common Isochronous Packet
CTR	Cycle Time Register
DVB	Digital Video Broadcasting (in Europe)
SI	Service Information
ETS	European Telecommunication Standard
MPEG	Moving Picture Experts Group
RTI	Real Time Interface
TS	Transport Stream
TSP	Transport Stream Packet
IEEE 1394 packet	IEEE 1394 isochronous packet defined in IEC 61883-1

## 4 Construction of IEEE 1394 packet

### 4.1 Structure of the MPEG2-TS data stream

The length of the source packet is 192 bytes (see Figure 1). The source packet consists of one MPEG2-TSP with a length of 188 bytes and a source packet header of 4 bytes. The source packet header contains a time stamp.

MPEG2-TS packets shall comply with ISO/IEC 13818 series.

### 4.2 Packetization of source packet of the MPEG2-TS data stream

A source packet is split into 8 data blocks with a length of 6 quadlets. Zero or more data blocks are packed in an IEEE 1394 isochronous packet. A receiver of the isochronous packets shall collect the data blocks of one source packet and combine them in order to reconstruct the source packet before sending this source packet to the application. There are restrictions on the transmission of fractions (see 5.2).

Active transmitters shall send an isochronous packet in every cycle. If not enough data is available to transmit in the isochronous packet, then an empty packet shall be transmitted.

### 4.3 Time stamp

The time stamp in the source packet header is used by isochronous data receivers for reconstructing a correct timing of the TSPs at their output. The time stamp indicates the intended delivery time of the first bit/byte of the TSP from the receiver output to the transport stream target decoder. The time stamp represents the 25 bits of the IEEE 1394 CYCLE\_TIME register (CTR) at the moment the first bit/byte of the TSP arrives from the application, plus some offset. The offset is equal to the constant overall delay of the TSP between the moment of arriving (of the first bit) and the moment the TSP (first bit) is delivered by the receiver to the application.

## 5 CIP header

### 5.1 Structure of CIP header

The structure of the CIP header (see Figure 2) for the MPEG2-TS is compliant with the two quadlet CIP header format explained in IEC 61883-1, 6.2.1. The static values of the CIP header components are as follows.

SID	.....	(depends on configuration)
DBS	00000110 <sub>2</sub>	(6 quadlets)
FN	112	(8 data blocks in one source packet)
QPC	000 <sub>2</sub>	(no padding)
SPH	1	(source packet header is present)
DBC	0 ... 255	(see 5.2)
FMT	100000 <sub>2</sub>	(format type of MPEG2-TS)
FDF	.....	(see 5.3)

## 5.2 DBC values

The first data block of a source packet (data block containing the source packet header) corresponds to a DBC value from which the three LSBs are '000'.

An isochronous packet contains 0, 1, 2 or 4 data blocks or an integer number of source packets.

Where the isochronous packet contains

- one data block, then the DBC value increments with 1;
- two data blocks, then the DBC value is a multiple of 2, the LSB is '0';
- four data blocks, then the DBC value is a multiple of 4, the two LSBs are '00'.

Where the isochronous packet contains  $n$  source packets ( $n$  is an integer) then the DBC value is a multiple of 8. The three LSBs are '000'.

## 5.3 FDF area

The structure of the FDF area is shown in Figure 3. The definitions of the fields are as follows:

- TSF (time shift flag) indicates a time-shifted data stream:
  - 0 = the stream is not time-shifted.
  - 1 = the stream is time-shifted.
- Res: reserved for future extension and shall be zeros.

## 6 Transmission of isochronous packets

### 6.1 Steps in transmission

An MPEG2-TS consists of TSPs with a length of 188 bytes. In Figure 4, an example is given of a TS which consists of several programmes. Very often only one or a few programs have to be transmitted. If a programme selection is carried out, then only those TSPs from that particular TS are transmitted. In this situation, the occupied bandwidth on the 1394 interface can be reduced. Reduction of the bit rate is carried out in a smoothing buffer. As a result of the smoothing operation, the TSPs will be shifted in time.

The TSPs at the output of the smoothing buffer are transmitted over the interface. During transmission this interface will introduce some jitter on the arrival time of the TSPs in the receiver.

In the MPEG2-TS there are strong requirements on the timing of the TSPs. The jitter introduced by the smoothing buffer and the transmitter of the interface shall be compensated. To do this, a time stamp is added to the TSP at the moment it arrives at the input of the smoothing buffer or, if smoothing is not applied, at the input of the digital interface. The receiver of the interface contains a receiver buffer. In this receiver buffer, the jitter introduced is compensated.



## 6.2 Late packets

The time stamp in the transmitted source packet header shall point to a value in future. If for some reason the delay in the transmitter is too long, resulting in a time stamp which points in the past (late packet), then this source packet is not transmitted.

A late packet occurs if the actual value of the CTR becomes equal to the value represented in the time stamp from the source packet header, before the isochronous packet(s) that contain the source packet (including CRC), has been transmitted.

In the case of transmission of one source packet/cycle, the interval needed to transmit the complete isochronous packet can be calculated (the clock frequency and the number of bits is known). If a late packet occurs, then an empty packet or the next valid packet should be sent and the late packet is discarded.

In the case of transmission of more than one source packet /cycle, then the same procedure is followed. It is allowed to discard all source packets from the isochronous packet if one source packet turns out to be a late packet.

In the case of transmission of fractions, it is recommended to first collect a complete source packet in the transmitter. If a late packet occurs, then the complete source packet should be discarded.

If a late packet occurs when some data blocks of the source packet have already been transmitted (for example, at a bus reset), then data blocks remaining in the transmitting buffer are removed.

## 7 Buffering in the receiver IEC 61883-4:2004

<https://standards.iteh.ai/catalog/standards/sist/f6ed5570-8c15-4cf3-899e->

Buffering in the receiver is needed to compensate jitter introduced by smoothing buffer and transmitter. It is expected that, at the moment of arriving in the receiver, the source packets or fractions of source packets are stored in the receiving buffer with the bus clock frequency (S100, S200 or S400 mode). The MPEG2 TSPs are read out of the receiver buffer and sent to the application at the intended delivery time of the first bit(byte) of the TSP. The intended delivery time is represented by the time stamp in the source packet header. The clock frequency used for reading the bytes from the TSP may be high.

Buffering needed for compensating jitter from the transmitter only is given in Table A.1 and buffering needed for compensating the jitter introduced by smoothing of the TS is given in Table A.2.

For the transmission of an MPEG2-TS as specified in DVB, it is expected that the buffer size in the receiver is 3 264 bytes.

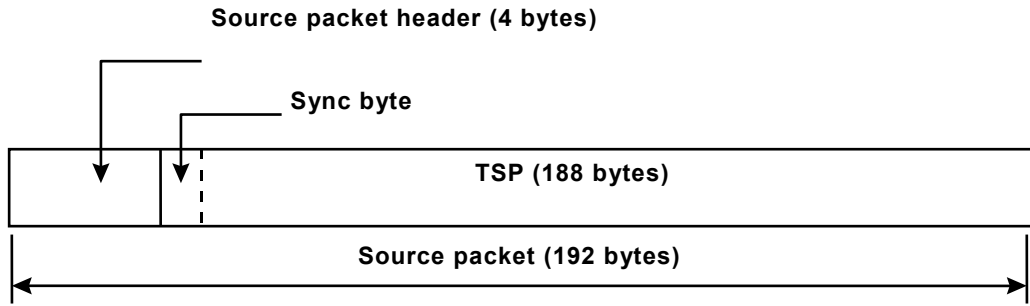


Figure 1a – Source packet

IEC 292/98

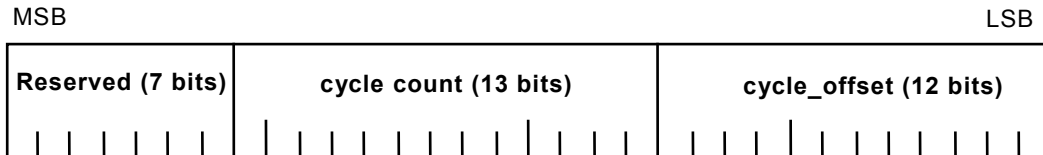


Figure 1b – Source packet header

IEC 293/98

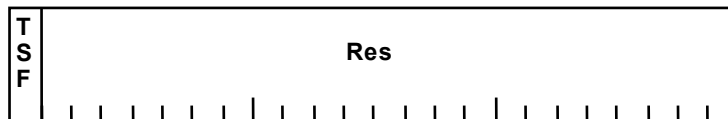
Figure 1 – Structure of a source packet



- SID source node ID
- DBS data block size in quadlets
- FN fraction number
- QPC quadlet padding count
- SPH source packet header
- Res reserved
- DBC data block continuity counter
- FMT format ID
- FDF format-dependent field

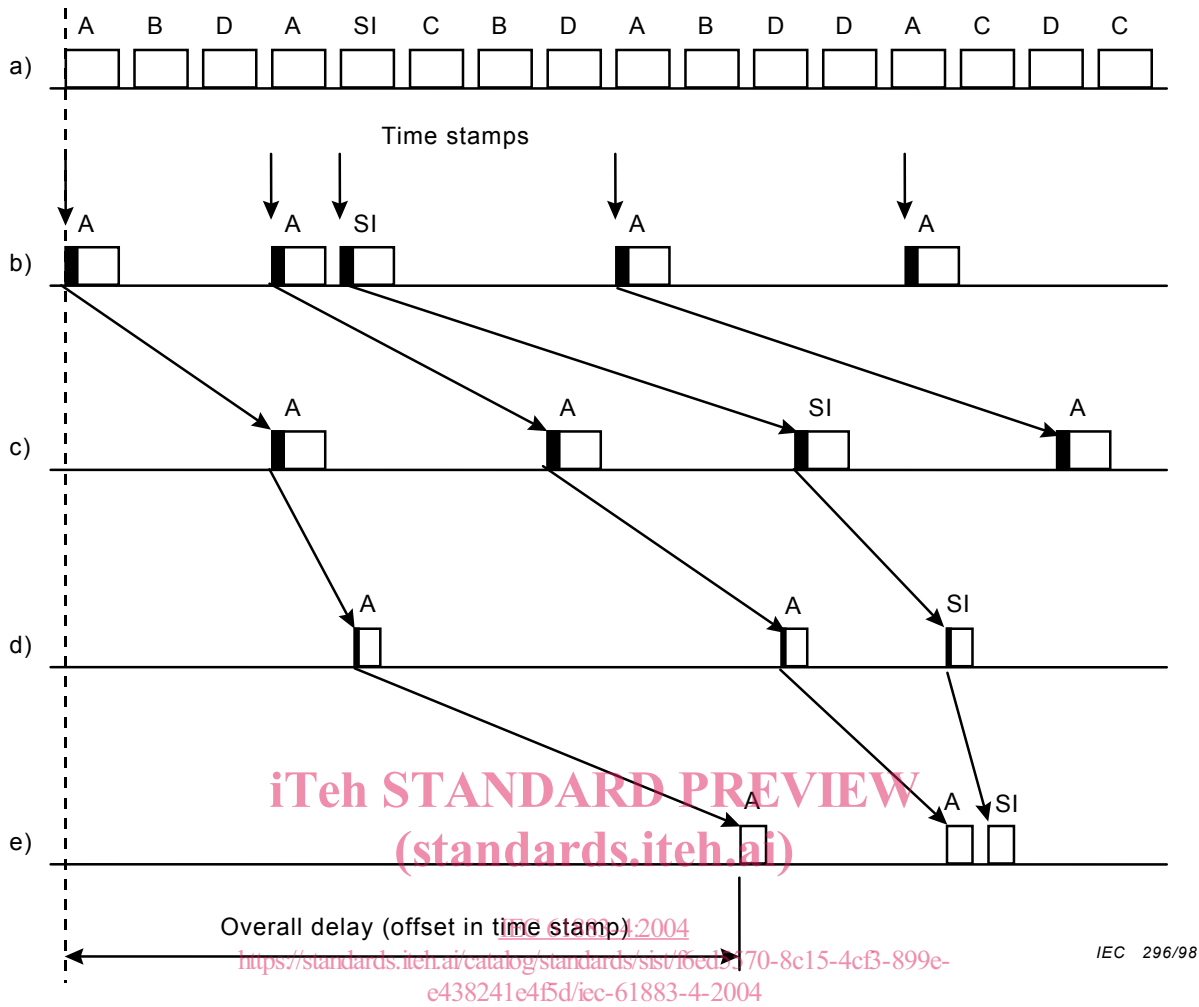
IEC 294/98

Figure 2 – CIP header for MPEG2-TS



IEC 295/98

Figure 3 – Structure of FDF area



- a) Complete transport stream with multiplex of programmes (A,B,C,D) and SI information
- b) source packets of the selected programme A with relevant SI information
- c) source packets at the output of the smoothing buffer
- d) source packets at the input of the 1394 receiver
- e) reconstructed timing for the TS

- b-c: Delay in smoothing buffer
- c-d: Delay from transmitter
- d-e: Delay in receiver buffer

The clock frequency for transferring the bytes of a TSP may be different in every situation.

**Figure 4 – Steps in the transmission of a transport stream**