IEC 61883-7

Edition 1.0 2003-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Consumer audio/video equipment – Digital interface –
Part 7: Transmission of ITU-R BO.1294 System B**

**Matériel audio/vidéo grand public – Interface numérique –
Partie 7: Transmission du Système B de l'UIT-R BO.1294**

IEC 61883-7:2003

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FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 61883-7 has been prepared by technical area 4, Digital system interfaces, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This bilingual version (2012-08) corresponds to the monolingual English version, published in 2003-01.

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

FDIS	Report on voting
100/558/FDIS	100/610/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.

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.

International Standard 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

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

CONSUMER AUDIO/VIDEO EQUIPMENT – DIGITAL INTERFACE –

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

1 Scope

This specification defines packetization and transmission for transport streams of ITU-R BO.1294 system B (DirecTV system/DSS) over the IEEE 1394 Serial Bus.

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

ITU-R BO.1294:1997, *Common functional requirements for the reception of digital multi-programme television emissions by satellites operating in the 11/12 GHz frequency range*[1]

IEEE 1394:1995, *Standard for a High Performance Serial Bus*

IEEE 1394a:2000, *Standard for a High Performance Serial Bus – Amendment 1*

3 Terms, definitions and abbreviations

For the purposes of this part of IEC 61883, the following terms and definitions apply.

3.1 Terms and definitions

For the purposes of this part of IEC 61883, the following terms and definitions apply.

3.1.1
byte
eight bits of data, used as a synonym for octet

NOTE The symbol for byte is B.

3.1.2
CSR architecture
convenient abbreviation of the following reference: ISO/IEC 13213:1994, *Information technology – Microprocessor systems – Control and status register (CSR) architecture for microcomputer buses*

3.1.3
quadlet
four bytes of data

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[1] In this document, the name "DSS" is used instead of ITU-R BO.1294 system B.

3.2 Abbreviations

For the purpose of this part of IEC 61883, the following abbreviations used in IEEE 1394 apply:

AV/C	Audio Video Control
CIP	Common Isochronous Packet
CTR	Cycle Time Register
HD	High Definition
IEEE	The Institute of Electrical and Electronics Engineers, Inc.
MPEG	Motion Picture Expert Group
TSP	Transport Stream Package

4 DSS transport stream

A DSS transport stream consists of transport stream packets with a length of 130 B.

NOTE Refer to Annex 1 of ITU-R BO.1294: 1997 for more information.

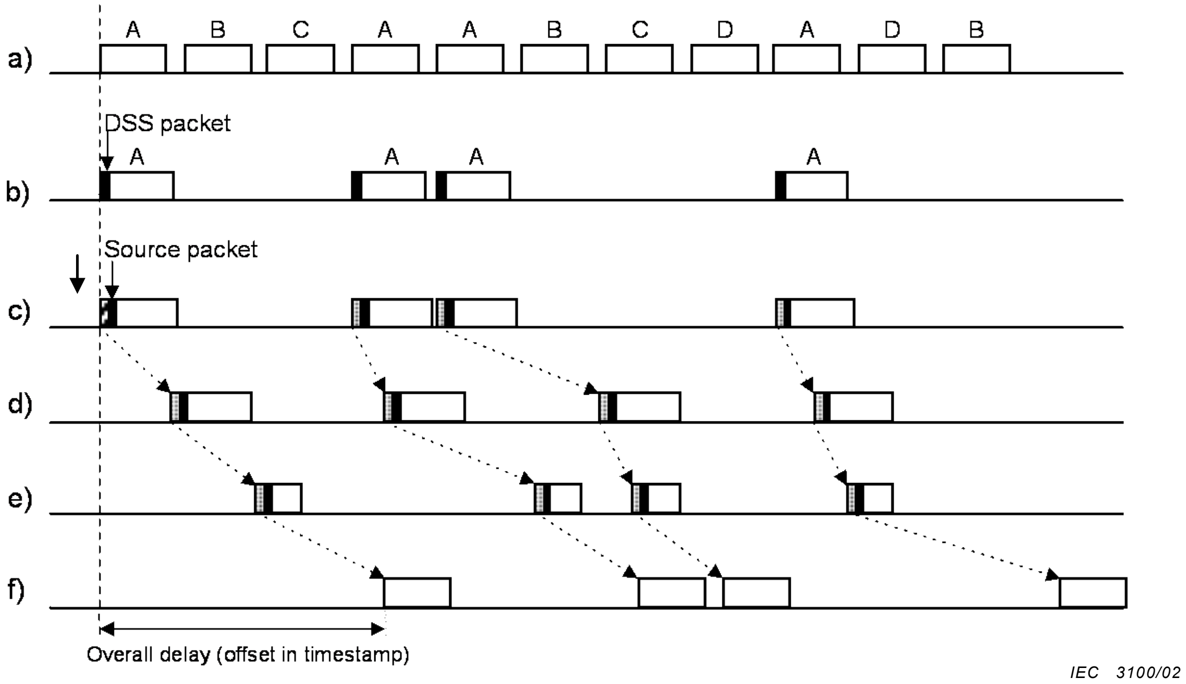
A stream may contain several programs. In Figure 1, an example is given of a transport stream, which consists of several programs. Often, only one or a few programs need to be transmitted. If a program selection is carried out, then only those transport stream packets from that particular transport stream are transmitted. In this situation, the occupied bandwidth on the IEEE 1394 interface can be reduced. Reduction of the bit rate is carried in a smoothing buffer. As a result of the smoothing operation, the transport stream packets will be shifted in time.

The transport stream packets at the output of the smoothing buffer are transmitted over the IEEE 1394 interface. During transmission, this interface will introduce some jitter on the arrival time of the transport stream packets in the receiver.

In the DSS transport stream, there are strong requirements on the timing of the transport stream packets. The jitter introduced by the both the smoothing buffer and the transmitter of the interface has to be compensated. This is done by adding a time stamp to the transport stream packets:

– at the moment it arrives at the input of the smoothing buffer; or
– at the input of the digital interface, if smoothing is not applied.

The receiver of the interface contains a receiver buffer, which compensates for the introduced jitter.



a) Complete transport stream with multiplex of programs (A,B,C,D)
b) Transport stream of the selected program A with DSS packet header (=DSS source packets)
c) Source packets with source packet header
d) Source packets at the output of the smoothing buffer
e) Source packets at the input of the 1394 receiver
f) Reconstructed timing for the transport stream

NOTE The clock frequency for transferring the bytes of a transport stream packet may be different in every situation

Figure 1 – Steps in the transmission of transport stream

Figure 2 shows how the DSS stream is processed between the original multiplex signal, the IEEE 1394 interface and the decoder.

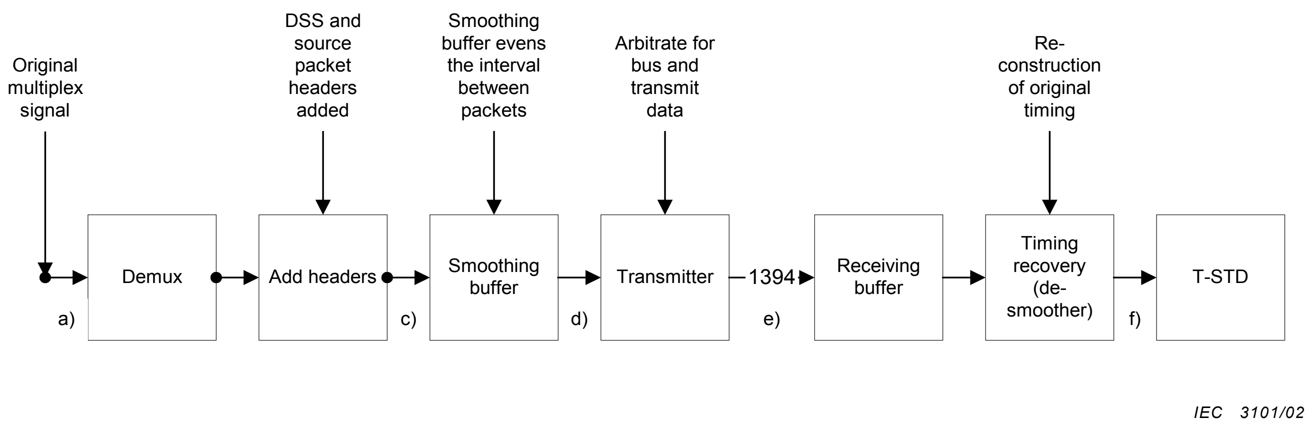


Figure 2 – DSS stream processing block diagram

5 Construction of an IEEE 1394 packet

5.1 Source packets

5.1.1 Structure of a source packet

The length of the source packet is 140 B as shown in Figure 3. The source packet consists of one DSS transport stream packet with a length of 130 B and a DSS packet header of 10 B.

The source packet header is additionally added before transmission to the smoothing buffer. The source packet header contains a time stamp.

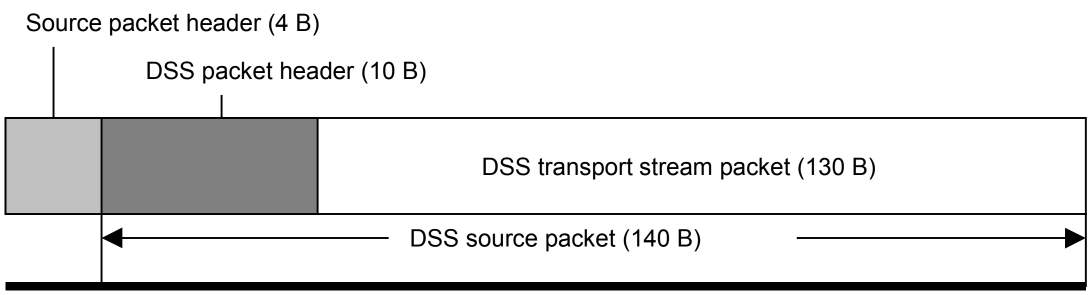


Figure 3 – Structure of a source packet

5.1.2 DSS packet header

Figure 4 shows the structure of a DSS packet header.

	msb							lsb
MSB	SIF	System Clock Count (23 bit)						
	EF	Reserved (0000000_2)						
	Reserved byte 0 (00_{16})							
	Reserved byte 1 (00_{16})							
	Reserved byte 2 (00_{16})							
	Reserved byte 3 (00_{16}) Reserved byte 4 (00_{16})							
LSB	Reserved byte 5 (00_{16})							

IEC 3103/02

Figure 4 – DSS packet header structure

Table 1 shows the DSS packet header components.

Table 1 – Fields in the DSS packet header

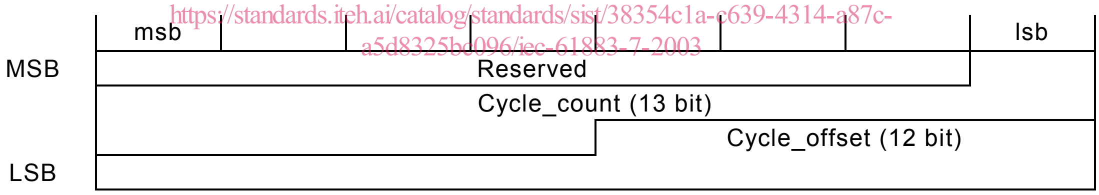
Field	Definition
SIF	System clock count Invalid Flag (1: invalid, 0: valid)
System clock count (23 bit)	A 23 bit field that is set to the lowest 23 bit of the 27 MHz clock counter, which is synchronized with MPEG system clock. The value of this counter may be different from the byte time stamp counter used to generate the byte time stamp in the auxiliary data packet (defined in 4.1 of Appendix 1 to Annex 1 of ITU-R BO.1294: 1997.
EF	Error Flag (1: Error, 0: no Error) Set to value 1 when the associated transport stream packet is erroneous

The system clock count is used by bit stream recorders, like D-VHS, to lock its system clock phase to the source stream without needing to look into the DSS transport stream packet for clock information. If a stream contains video and/or audio application packets, then the stream shall contain packets with a valid system clock count. The maximum interval between valid system clock counts (or “ticks”) shall be 200 ms. Therefore many audio and video packets in between may not contain a valid system clock count.

If a stream does not contain video or audio application packets, then the system clock count is not required.

5.1.3 Source packet header

Figure 5 shows the structure of the source packet header.



IEC 3104/02

Figure 5 – Structure of the source packet header

The reserved bits are zero. The cycle_count and cycle_offset fields represent a time stamp.

The time stamp is used by isochronous data receivers for reconstructing a correct timing of the transport stream packets at their output. The time stamp indicates the intended delivery time of the first bit/byte of the transport stream packets from the receiver output to the T-STD (Transport Stream Target Decoder). The time stamp represents the 25 bit of the IEEE 1394 CYCLE_TIME register (CTR) at the moment the first bit/byte of the transport stream packet arrives from the application, plus an offset which is equal to the constant overall delay of the transport stream packet between the moment of arriving (of the first bit) and the moment the transport stream packet (first bit) is delivered by the receiver to the application.

5.1.4 Fractions

A source packet is split into 4 data blocks with a length of 9 quadlets. Zero or more data blocks are packed in an IEEE 1394 isochronous packet. A receiver of the isochronous packets collects the data blocks of one source packet and combines 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 5.2.2).

5.2 Isochronous packets

5.2.1 CIP header for the DSS transport stream

The structure of the CIP header for DSS transport stream conforms to the two quadlet CIP header format explained in IEC 61883-1, 6.2.1. Table 2 shows the values of the CIP header components.

Table 2 – Fields in the CIP header

Field	Value	Description
SID	…	Depends on configuration
DBS	00001001_2	9 quadlets
FN	10_2	4 data blocks in one source packet
QPC	000_2	No padding
SPH	1	Source packet header is present
DBC	0 … 255	See 5.2.2
FMT	100001_2	Format type of DSS (ITU-R BO.1294 System B)
FDF	…	See 5.2.3

5.2.2 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 two LSBs are 00_2.

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

– If the isochronous packet contains:
  One data block, then the BDC value increments by 1;
  Two data blocks, then the DBC value is a multiple of 2, the LSB is 0_2.
– If the isochronous packet contains *n* source packets (*n* is an integer) then the DBC value is a multiple of 4. The two LSBs are 00_2.

5.2.3 FDF data

The structure of the CIP header is shown in Figure 6.

TSF (Timeshift_flag): indicates a time-shifted stream

– 0 = the stream is not time-shifted;
– 1 = the stream is time-shifted.