

SMPTE STANDARD

for Television —

Packet Format and Transmission Timing of DV-Based Data Streams over IEEE 1394



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1 Scope

This standard specifies the packet format and transmission timing for DV-based 25 Mb/s, 50 Mb/s and 100 Mb/s data streams over an IEEE 1394 interface. This standard covers the source packet structure for transmitting the DIF blocks, the definition of a CIP header, the transmission order and timing, and includes information on both real time and faster than real time transmission.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

SMPTE 314M-1999, Television — Data Structure for DV-Based Audio, Data and Compressed Video — 25 and 50 Mb/s

SMPTE 370M-2002, Television — Data Structure for DV-Based Audio, Data and Compressed Video at 100Mb/s — 1080/60i, 1080/50i, 720/60p

IEC 61883-1 (2003-01), Consumer Audio/Video Equipment — Digital Interface — Part 1: General

IEC 61883-2 (1998-02), Consumer Audio/Video Equipment — Digital Interface — Part 2: SD-DVCR Data Transmission

IEEE 1394-1995, Standard for a High Performance Serial Bus

IEEE 1394a-2000, Standard for a High Performance Serial Bus — Amendment 1

3 General description

Real time transmission of video and audio data using the IEEE 1394 interface is achieved by transmitting an isochronous packet defined in IEEE 1394 that carries video and audio data. This packet is transmitted every 125 μ sec. The structure of the isochronous packet is defined in IEC 61883-1.

For transmission of a DV-based data stream over an IEEE 1394 interface, the DIF blocks defined in SMPTE 314M and SMPTE 370M are placed into the isochronous packets and transmitted. Figure 1 shows a transmission of DIF blocks present in the isochronous packet payload.

The DIF blocks are combined to form a source packet, which is a basic unit of the video and audio data for isochronous packet transmission.

The structure and length of the source packet changes for different DV-based bit rates (25, 50, 100 Mb/s). The source packet is subsequently divided into one or more data blocks that are then mapped into an isochronous packet.

The isochronous packet consists of a CIP header that contains information on the type of transmitted data and time stamp information for synchronization of a transmitter and receiver, in addition to the payload area. The isochronous receiver after receiving isochronous data reformats the transmitted data blocks and finally reconstructs the source packet.

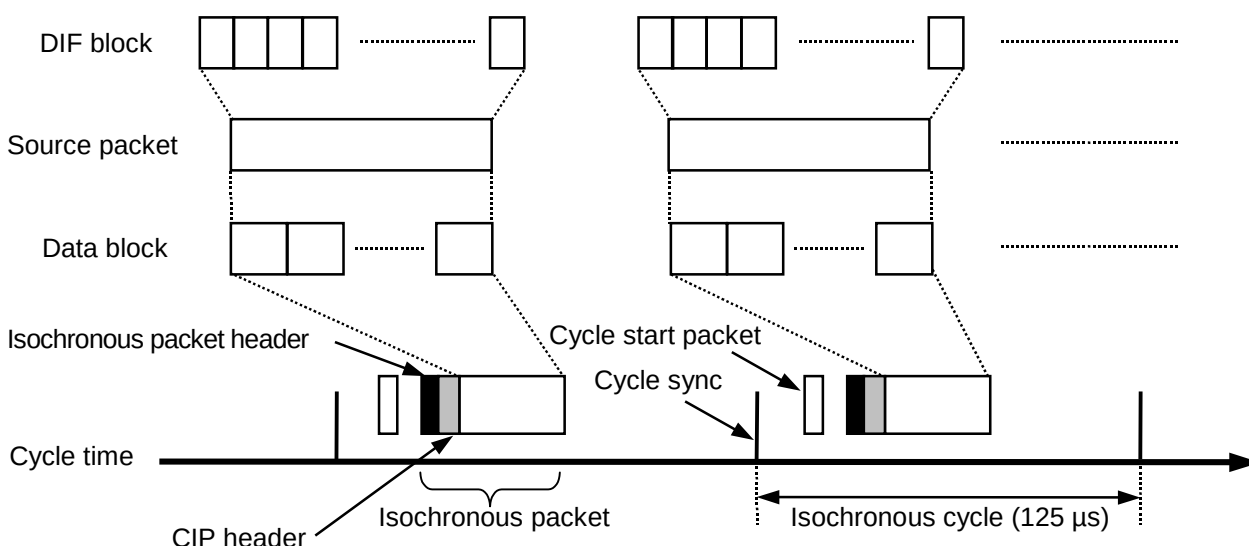


Figure 1 – Transmission of DIF blocks using isochronous packets (informative)

The number of transmitted source packets inside the isochronous packet varies, and depends on the transmission speed. When the video and audio data is transmitted at a “normal” speed (“normal” speed meaning equal to the television system frame rate), a single source packet is transmitted in a single isochronous packet. In faster than real-time transmission, the number of source packets contained in an isochronous packet increases in proportion to the transmission speed.

4 Structure of a 1394 packet

4.1 Source packet structure

For the DV-based data stream, the data structure and transmission order of DIF blocks for 25 Mb/s and 50 Mb/s bit rates is defined in SMPTE 314M, and for a 100 Mb/s rate in SMPTE 370M.

NOTE – The bit rate, including all overhead for a DV-based 25 Mb/s stream, is equal to 28.8 Mb/s (120 kBytes/frame at 59.94 Hz or 144 kBytes/frame at 50 Hz). The bit rate for a DV-based 50 Mb/s stream is double that of a DV-based 25 Mb/s stream and for a 100 Mb/s stream is quadruple that of a 25 Mb/s stream.

The source packet size and the number of DIF blocks that are contained in the source packet are determined according to the DIF structure and bit rate.

A single transmission channel provides a data rate of 25 Mb/s; therefore, a DV-based 25 Mb/s data stream uses one channel, a 50 Mb/s stream uses two channels and a 100 Mb/s stream uses four channels, carried within each video frame. The data from individual channels are always transmitted sequentially.

Each channel consists of 10 DIF sequences in a 60 Hz system, or 12 DIF sequences in a 50 Hz system.

DIF sequences are transmitted in order from DIF sequence 0 to DIF sequence 9(11). Each DIF sequence is composed of 150 DIF blocks. DIF blocks within a DIF sequence are transmitted sequentially from DIF block 0 to DIF block 149 (see annex C).

4.1.1 Source packet structure in a 25 Mb/s DV-based stream

The source packet size for the 25 Mb/s DV-based stream defined in SMPTE 314M shall be 480 bytes; therefore, it consists of 6 DIF blocks. The source packet shall not be sub-divided and is equal in size to a data block. The structure of the source packet and a data block is shown in figure 2. The correspondence between DIF blocks and source packets is shown in figures 3 and 4.

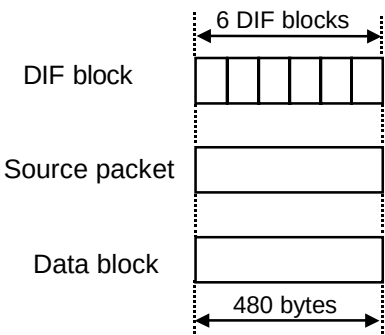


Figure 2 – Structure of a source packet and data block for 25 Mb/s stream

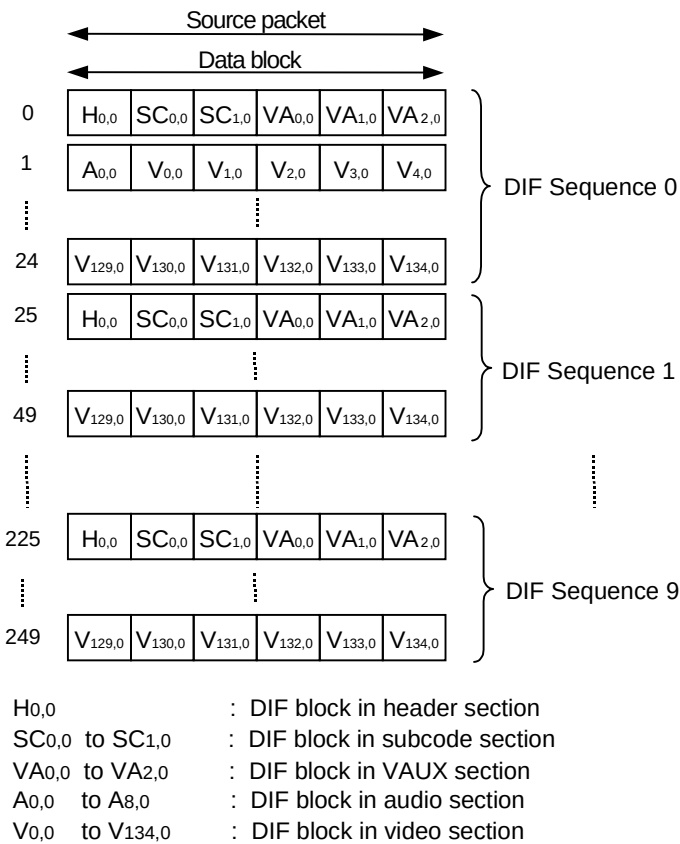


Figure 3 – Source packet structure for 25 Mb/s (525/60 system)

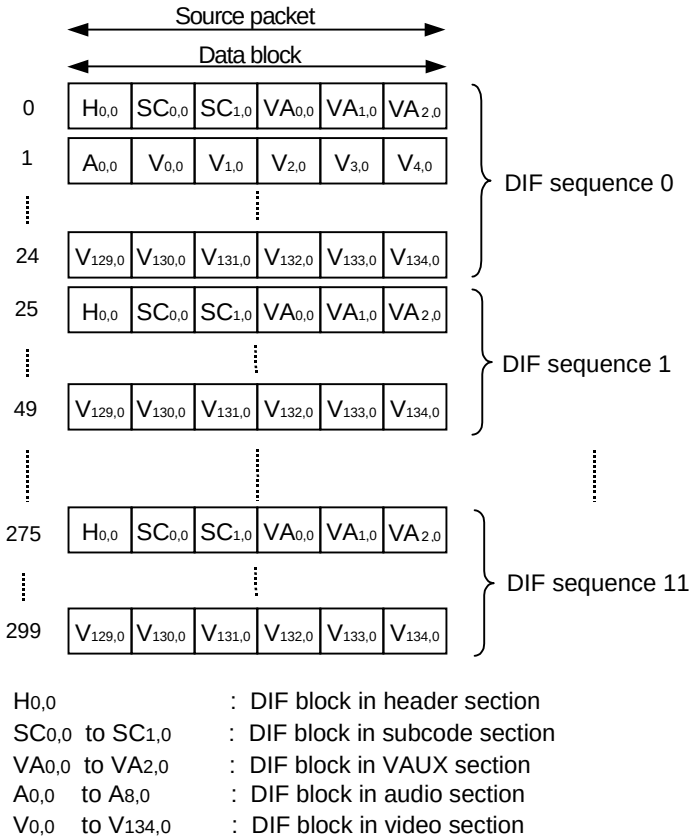


Figure 4 – Source packet structure for 25 Mb/s (625/50 system)

4.1.2 Source packet structure in a 50 Mb/s DV-based stream

The source packet size for the 50 Mb/s DV-based stream defined in SMPTE 314M shall be 960 bytes; therefore, it consists of 12 DIF blocks. The source packet shall be sub-divided into two data blocks. The structure of the source packet and data blocks is shown in figure 5. The correspondence between DIF blocks and source packets is shown in figures 6 and 7.

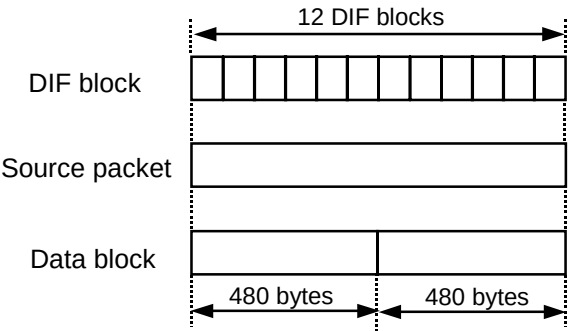


Figure 5 – Structure of a source packet and data blocks for 50 Mb/s stream

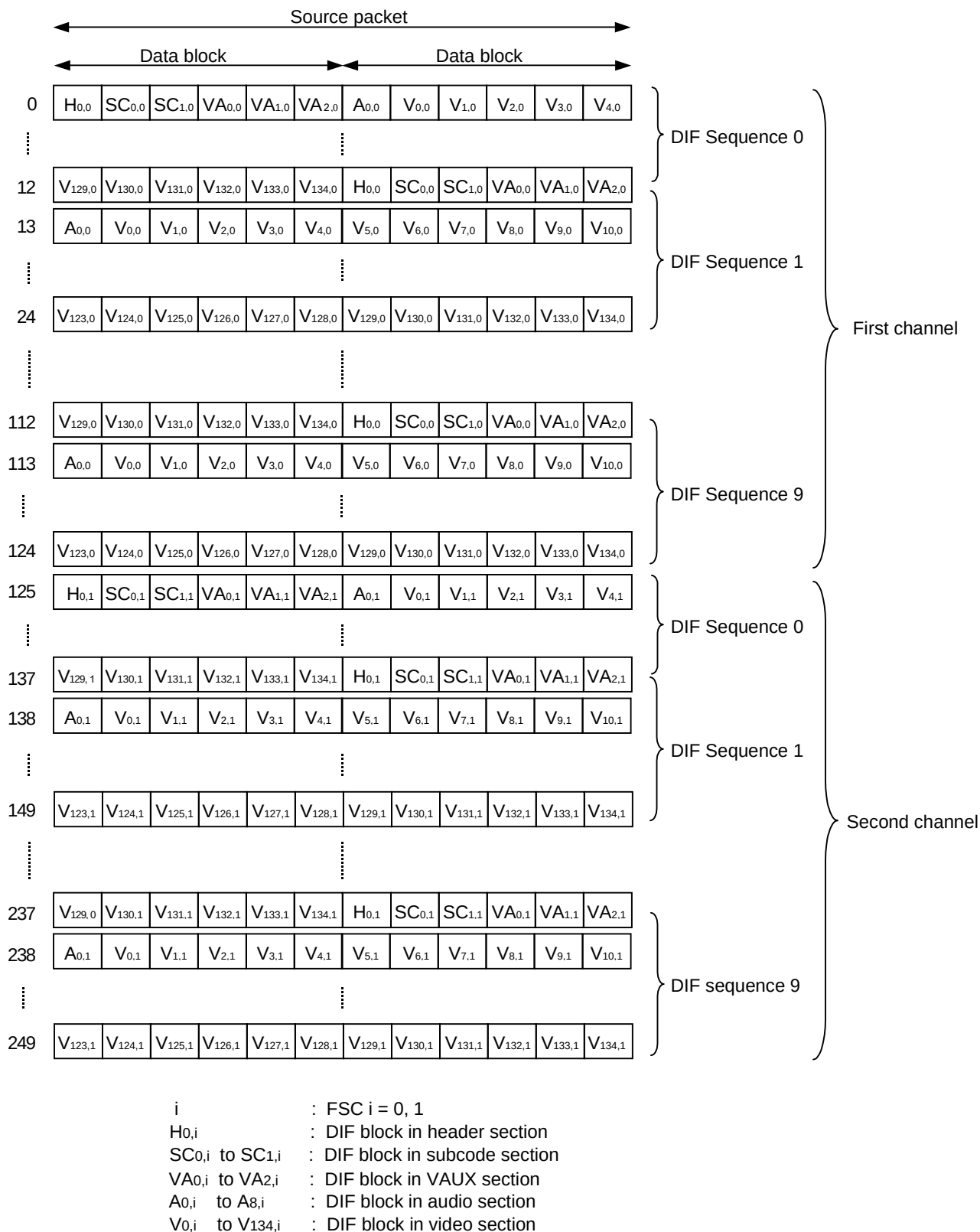


Figure 6 – Source packet structure for 50 Mb/s (525/60 system)