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SMPTE STANDARD

for Television — Encapsulation of Data Packet Streams over SDTI (SDTI-PF)



Page 1 of 9 pages

1 Scope

This standard specifies an open framework for encapsulating data packet streams and associated control metadata over the SDTI transport (SMPTE 305M). Encapsulating data packet streams on SDTI allows them to be routed through conventional SDI (SMPTE 259M) equipment.

This standard specifies a range of packet types which may be carried over SDTI. The range of packet types carried may be expanded as requirements develop. The standard does not attempt to specify the payload contained in any packet. It offers options to add specific information to each individual packet including localized user data space, forward error correction (FEC), and a mechanism for accurate packet retiming at the decoder.

The standard also offers a limited capability for metadata to be added providing packet control information to aid the successful transfer of packets. The specification of the metadata follows the K-L-V approach of the SMPTE metadata dictionary and provides extensibility for future requirements.

For easy reference, this standard is abbreviated to the term SDTI-PF.

This standard is limited to SDTI operating at a bit rate of 270 Mb/s and 360 Mb/s as defined by SMPTE 305M.

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 edition of the standards indicated below.

ANSI/SMPTE 259M-1997, Television — 10-Bit 4:2:2 Component and $4f_{sc}$ Composite Digital Signals — Serial Digital Interface

SMPTE 305M-1998, Television — Serial Data Transport Interface

SMPTE RP 168-1993, Definition of Vertical Interval Switching Point for Synchronous Video Switching

3 General specification

Most packet streams do not have critical timing requirements and a decoder can output packets in the order in which they were encoded, but with increased packet jitter resulting from the buffering of packets onto SDTI lines. The result of the SDTI-PF packet encapsulation process is to introduce both delay and jitter to the packet stream. However, MPEG-2 transport stream (MPEG-2 TS) packets are one case where a relatively small packet jitter specification is required to ensure minimal impact on MPEG-2 transport stream clock recovery and buffering circuits. This standard contains provisions to allow the packet jitter to be reduced to insignificant levels while the delay is an issue addressed by the method of packet buffering at the encoder. As a benchmark, the specification is defined so that a low packet jitter source, such as DVB-ASI, can be carried through the SDTI-PF and be decoded to create an output with negligible packet jitter.

Although MPEG-2 TS packets are the most critical packet type for decoder timing accuracy, this standard

also allows for other kinds of packets to be carried over the SDTI, with or without buffering, to reduce packet jitter. Such packets may be ATM cells and packets based on the unidirectional internet protocol (Uni-IP).

This standard provides several features for the carriage of packet streams such as:

- A high packing density;
- A flexible arrangement of data packet types and associated packet metadata;
- Carriage of multiple channels of multiple data packet types;
- Provisions for a powerful forward error correction (FEC) specification;
- The ability to reproduce accurate data packet output timing;
- The ability to add embedded user information.

The control information associated with data packets can be used to:

- Provide a continuity counter to detect SDI switching;
- Provide a channel handle for transfers of multiple channels of data packets between the same source and destination addresses;
- Define the position of a data packet in a stream.

4 SDTI parameters

SMPTE 305M specifies the SDTI for bit rates of 270 Mb/s and 360 Mb/s. Equipment may operate on only 270 Mb/s and still be compliant with this standard.

The SDTI-PF uses the variable block mode of the SDTI as shown in figure 1. The separator and end code words are special 10-bit values defined in SMPTE 305M. All data in the space between the separator and end codes shall be 10-bit words where the data comprises 8 bits entered into bits b0 to b7 of the 10-bit word, b8 shall be set to even parity of bits b0 and b7, and b9 shall be set to odd parity.

The block type word of the SDTI header shall be set to variable block mode according to SMPTE 305M.

The SDTI data type word shall be set to the value 11_h indicating the data packet format (PF) variable block payload. This value shall be registered in the data types table of SMPTE 305M as a 10-bit word of value 211_h.

This standard shall not use the data extension facility of SMPTE 305M.

4.1 SDTI line and address numbers

Since the data in each SDTI variable block may continue through as many lines as necessary until the block end, it is necessary that the SDTI header line numbers are contiguous. It is also necessary that the SDTI header source and destination address values are constant throughout the transmission of all lines associated with any one SDTI variable block.

4.2 SDTI switching

The arbitrary switching of SDTI data streams, although at the picture frame boundary, may affect the ability to decode successfully the contents of the data packets without the use of special processing equipment to mitigate the switching effects. The lines affected by a picture switch are defined in SMPTE RP 168. It is recommended to avoid the use of the lines defined by SMPTE RP 168 together with the lines immediately prior to and following the switch line where transient conditions may occur. A continuity count can be provided to indicate variable blocks affected by a switch.



Figure 1 – Format of the SDTI variable block