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SMPTE STANDARD**SMPTE 362M-2002**

for Television —

Object Data Format for the Exchange of
DV-Based Audio, Data and Compressed Video
using ATM Common Layer over Asynchronous
Transfer Mode (ATM) AAL Type 1

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1 Scope

This standard defines the object data format for the exchange of DV-based audio, data, and compressed video (which data structure is defined in SMPTE 314M) over the common layer defined in SMPTE 354M. The standard covers the transmission of audio, compressed video, and subcode data with DV-based 25-Mb/s and 50-Mb/s data structures for 525/60 and 625/50 systems and the transmission of the header data of serial data transport interface defined in SMPTE 305.2M.

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.

SMPTE 305.2M-2000, Television — Serial Data Transport Interface (SDTI)

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

SMPTE 354M, Television — ATM Common Layer for Transport of Packetized Audio, Video and Data over Asynchronous Transfer Mode using ATM Adaptation Layer Type 1

3 Common layer

As defined in SMPTE 354M, the common layer is the next higher layer of the AAL1 and provides transmission

packets of applications. The common layer consists of two layers: the lower layer is the SYNC layer and the higher layer is the container layer.

3.1 SYNC layer

The SYNC stream block (SSB), which is defined in the SYNC layer, includes containers. The SSB has one or more containers, and the transmission order of the SSB is defined in SMPTE 354M.

3.2 Container layer

The container layer defines the structure of the container in the SSB. Each container is intended to hold a video frame (optionally two fields) worth of packetized audio, video, and data.

3.2.1 Container format

The container has two basic modes: the simple mode and the extended header mode. The simple mode supports four objects of several restricted types. The extended header mode supports up to 16 objects.

3.2.2 Object classification system

As described in SMPTE 354M, the container system provides a mechanism for defining the bit and byte packing of audio-video data types. Object classification is represented in the header by the object class word. This word is composed of two key elements: the type byte and the index byte object. The type byte is a coarse classification of the data type, and the index type is the key into the table (which is defined in figure 6 of SMPTE 354M) which represents data types.

3.2.3 Compressed AV stream

Video program is defined as an object class 20_h and *compressed AV stream (dv-based)* is defined as table index 0001_h of the video program object in SMPTE 354M. The format of a compressed AV stream is based on the subcontainer format shown in figure 1.

The subcontainer is composed of a 12-byte stream header and multiple/single compressed data stream (CDS) packets.

3.2.3.1 Stream header

The stream header, which is shown in figure 1, is composed as follows:

Stream descriptor: 32 bits (4 bytes)
Stream time stamp: 32 bits (4 bytes)
CDS packet length: 32 bits (4 bytes)

3.2.3.2 Stream descriptor

The stream descriptor (which is shown in figure 2) is composed of the following:

Packet type: 16 bits (2 bytes)
Stream type: 16 bits (2 bytes)

3.2.3.2.1 Packet type

The packet type is 16-bit data and indicates the CDS packet structure. The packet type is defined as follows:

– Bit 31: The existence indication bit of the packet time stamp word.

0 - indicates that the packet time stamp word exists.
1 - indicates that the packet time stamp word does not exist.

– Bit 30: The existence indication bit of the byte count word.

0 - indicates that the byte count word exists.
1 - indicates that the byte count word does not exist.

– Bit 29: The existence indication bit of the FEC (forward error correction) word.

0 - indicates that the FEC word exists.
1 - indicates that the FEC word does not exist.

– Bit 28: The indication bit that indicates multiple packets or single packet.

0 - indicates that the subcontainer is composed of a single CDS packet.
1 - indicates that the subcontainer is composed of multiple CDS packets.

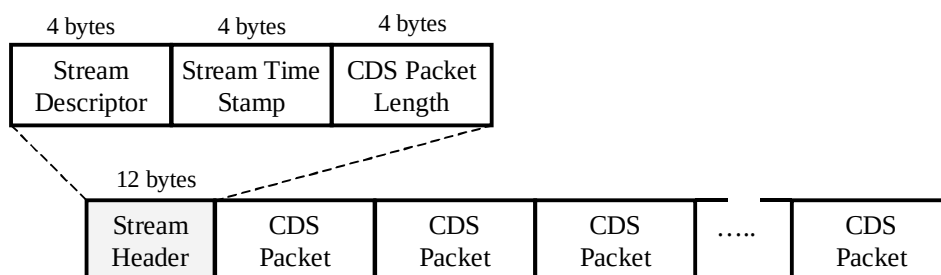


Figure 1 – Compressed AV stream format

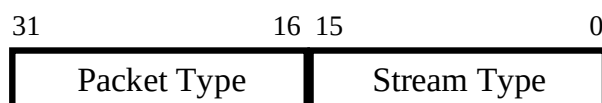


Figure 2 – Stream descriptor

- Bit 27: The indication bit that indicates that the stream time stamp word is valid or invalid.

0 - indicates that the stream time stamp word is valid.

1 - indicates that the stream time stamp word is invalid.

- Bit 26: The indication bit that indicates fixed-packet size or variable-packet size.

0 - indicates that the CDS packet size is fixed.

1 - indicates that the CDS packet size is variable and the CDS packet length word is invalid.

- Bit 25 and Bit 24: Reserved for future purposes (default value is hex 00).

- Bit 23 through Bit 16: Indicates the byte length of FEC.

3.2.3.2.2 Stream type

The stream type is 16-bit data. The definition of the stream type depends on the compressed data stream.

3.2.3.3 Stream time stamp

The stream time stamp is composed of a 32-bit packet length word and indicates the point of time at which the compressed AV stream object is multiplexed into the container. The stream time stamp is used for recovering the relative stream object time from end to end and is valid when B27 of the packet type is set to 0. The synchronization scheme using this word is described later.

3.2.3.4 CDS packet length

The CDS packet length is composed of a 32-bit packet length word and indicates the byte length of the CDS packet multiplexed immediately after the stream header. The CDS packet length word is valid when B27 of the packet type is set to 0.

3.2.3.5 CDS packet format

The CDS packet format is composed of a 32-bit packet time stamp word, a 32-bit byte count word, an N byte CDS packet payload, and M bytes FEC. The CDS packet format is shown in figure 3.

3.2.3.5.1 CDS packet time stamp

The CDS packet time stamp is a 32-bit word and exists when B31 of the packet type is set to 0. The CDS packet time stamp is used for recovering the relative CDS packet timing from end to end. The reference clock for the packet time stamp is the same frequency as that for the object time stamp in the container header. The synchronization scheme using this word is described later.

3.2.3.5.2 Byte count

The byte count is a 32-bit word and exists when B30 of the packet type is set to 0. The byte count indicates the byte length of the variable CDS packet payload size or the valid byte length in the fixed CDS packet payload. If the packet time stamp word does not exist, the byte count word is located at the head word of the CDS packet.

3.2.3.5.3 CDS packet payload

The CDS packet payload format depends on the compressed data stream.

3.2.3.5.4 FEC (forward error correction)

The forward error correction is M byte code and exists when B29 of the packet type is set to 0. The FEC applies to the first byte through the last byte of the CDS packet.

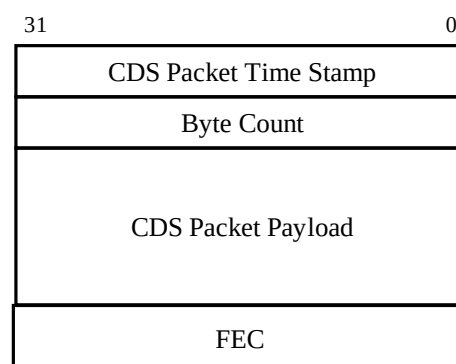


Figure 3 – CDS packet format

3.2.3.6 Synchronization scheme

In a frame/field compression system, such as DV-based audio, data and compressed video, if only the frame/field frequency is recovered accurately, it is not necessary to recover the relative CDS packet timing accurately but to recover the CDS packet within the frame/field in which they were generated by the sender. Therefore, the stream time stamp (STS) or the CDS packet time stamp (CTS) is not always necessary.

4 Object for SDTI information and DV-based audio, data and compressed video

4.1 Defined objects

Two kinds of objects, the object for SDTI information and the object for DV-based audio, data, and compressed video are defined and shown in figure 4.

4.2 Object format for SDTI information

The object for SDTI information (SDTI header is defined in SMPTE 305.2M) is treated as the ancillary data type object and is shown in figure 5. The line number information in the object for SDTI information shall be the same as the start line number of each video frame in the SDTI channel unit. The object for SDTI information shall correspond to data which are B0, B1, B2, B3, B4, B5, B6, and B7 (8 bits) of each word numbered from 3 to 52 in the SDTI header (which is defined in SMPTE 305.2M). The data length is 10 bits; B0 through B9. B9 is the most significant bit (MSB).

4.3 Object format for DV-based audio, data and compressed video

DV-based audio, data, and compressed video data are treated as the CDS packet payload of the video program object.

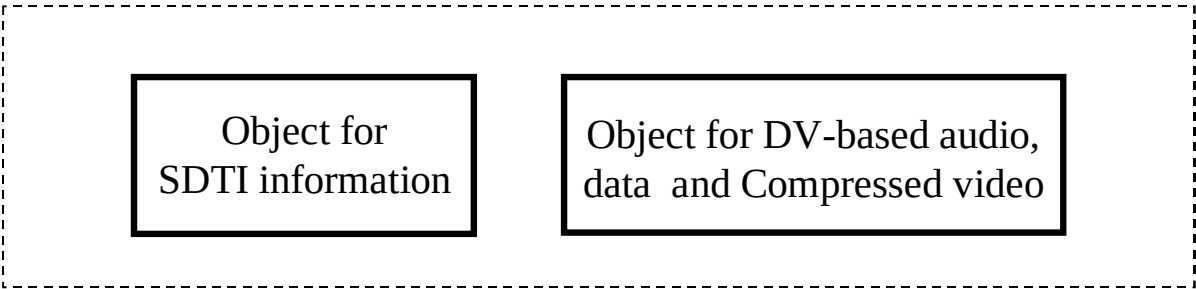


Figure 4 – Two kinds of defined objects

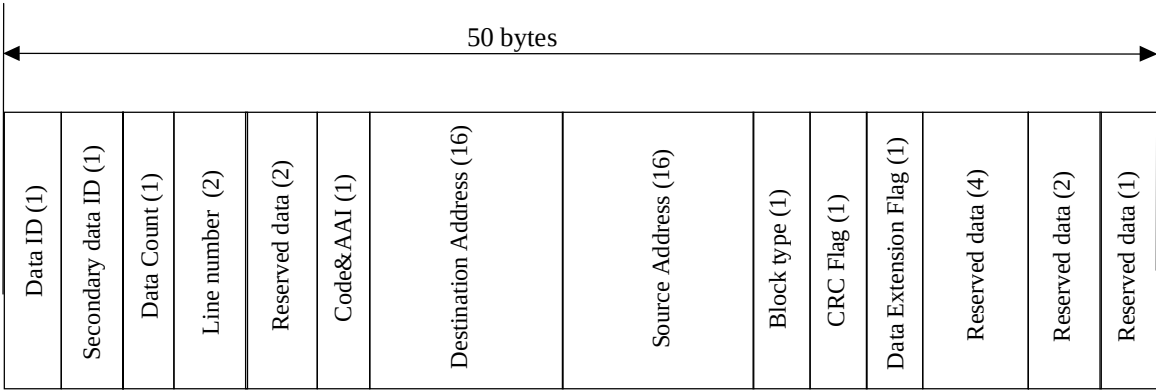


Figure 5 – Object for SDTI information