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Note:

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General Exchange Format



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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative Practices. This SMPTE Engineering Document was prepared by Technology Committee N26.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Standard. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

Introduction

This Standard describes one file format that can be used to move simple clips or compound clips. It also describes how the file transfer protocol (FTP) can be used for the transfers. This includes file name syntax to support an implementation of partial stream transfers and other extensions.

The byte streams described in this Standard can be moved using any reliable transfer protocol and a network that supports that protocol. Annex A describes one protocol stack and a network technology that are in use today. There is no reason other protocols such as XTP could not be used. XTP supports features such as reliable multicast which are not part of FTP.

In many applications, real-time broadcast schemes are used. The byte stream for simple clips described in this Standard can be used under those conditions. However, this practice is not recommended for compound clips.

The EBU/SMPTE Joint Task Force report also describes objectives for rich file formats and rich metadata capabilities in future designs. The file format described in this Standard was in place before the task force report was issued and therefore does not meet all of the report's stated objectives.

This type of transfer was initially implemented on a Fibre Channel network using FTP with transmission control protocol (TCP) and Internet protocol (IP). This transfer technique is well suited to implementations on IP networks such as Fibre Channel, Ethernet, or ATM, although it can be used on any reliable protocol stack and data network technology. An example of transfers over an IP link using the IETF standard FTP is provided in Annex A.

1 Scope

This Standard specifies a file exchange format for the transfer of simple clips and compound clips between television program storage systems. This Standard provides documentation of formats and contents, including specification of packet types, contents, and order. Informative information on a control scheme, a protocol stack, and an interface is included.

Physical links (data network technology) are not specified in this Standard. Any appropriate physical link may be used.

Simple clips and compound clips, as defined in this Standard, are specified as alternatives to traditional approaches to transferring television programming between storage devices.

This Standard defines two simple constructs for transfer of material:

- 1) A simple clip format in which all audio, video and time code tracks start and stop coincidentally and where the audio and video tracks are contiguous, and;
- 2) A compound clip format, which is a collection of audio, video, and time code tracks, any of which may contain several segments, with cut transitions between the segments. Transitions may occur on each track independently of the other tracks.

This Standard is independent of material format, whether compressed or not, and allows material to be transferred across a network before recording has finished. The transferred material specified in this Standard includes Motion JPEG (MJPEG), MPEG-1, MPEG-2, and DV-based video compression standards, with associated audio, time code, and user data that may include user-defined metadata. The video, audio, and time code material is time multiplexed to provide immediate availability at the receiver.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword "reserved" indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword "forbidden" indicates "reserved" and in addition indicates that the provision will never be defined in the future.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next; followed by formal languages; then figures; and then any other language forms.

3 Normative References

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

SMPTE 12M-1-2008, Television — Time and Control Code

SMPTE 292-2008, 1.5 Gb/s Signal/Data Interface

SMPTE 314M-2005, Television — Data Structure for DV-Based Audio, Data and Compressed Video — 25 and 50 Mb/s

SMPTE 337-2008, Format for Non-PCM Audio and Data in an AES3 Serial Digital Audio Interface

SMPTE 338-2008, Format for Non-PCM Audio and Data in AES3 — Data Types

SMPTE 340-2008, Format for Non-PCM Audio and Data in AES3 — ATSC A/52B Digital Audio Compression Standard for AC-3 and Enhanced AC-3 Data Types

SMPTE RP 202-2008, Video Alignment for Compression Coding

AES3-2003, AES Standard for Digital Audio — Digital Input-Output Interfacing — Serial Transmission Format for Two-Channel Linearly Represented Digital Audio Data

ANSI INCITS 4-1986 (R2002), Information Systems — Coded Character Sets — 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII) [formerly ANSI X3.4-1986 (R1997)]

ATSC A/52:2005, Digital Audio Compression (AC-3) Standard

IEEE 754-1985 (R1990), Standard for Binary Floating-Point Arithmetic

ISO/IEC 11172-2:1993, Information Technology — Coding of Moving Pictures and Associated Audio for Digital Storage Media at Up to About 1.5 Mb/s — Part 2: Video

ISO/IEC 11172-2:1993/Cor 1:1996

ISO/IEC 11172-2:1993/Cor 2:1999

ISO/IEC 13818-1:2007, Information Technology — Generic Coding of Moving Pictures and Associated Audio Information: Systems

ISO/IEC 13818-1:2007/Cor 1:2008

ISO/IEC 13818-2:2000, Information Technology — Generic Coding of Moving Pictures and Associated Audio Information: Video

ISO/IEC 13818-2:2000/Cor 1:2007

ISO/IEC 13818-2:2000/Cor 2:2007

ISO/IEC 13818-2:2000/Amd 1:2001 — Support for Colour Spaces

ISO/IEC-61834-2 (1998-08), Recording — Helical-Scan Digital Video Cassette Recording System Using 6.35mm Magnetic Tape for Consumer Use (525-60, 625-50 and 1250-50 Systems), Part 2: SD Format for 525-60 and 625-50 Systems

ISO/IEC 10918-1:1994, Information Technology — Digital Compression and Coding of Continuous-Tone Still Images (JPEG)

ISO/IEC 10918-1:1994/Cor 1:2005 ITU-R BT.601-5 (10/95), Studio Encoding Parameters of Digital Television for Standard 4:3 and Wide-Screen 16:9 Aspect Ratios

ITU-R BS.1196 (1995) (Annex 2), Audio Coding for Digital Terrestrial Television Broadcasting

ITU-T H.261 (03/93), Video Codec for Audiovisual Services at p x 64 kb/s

ITU-T T.81 (1992) Information Technology — Digital Compression and Coding of Continuous-Tone Still Images: Requirements and Guidelines (JPEG)

4 Definitions

The following terms are defined for use in this Standard.

Notes:

- 1) For standard definition material, the traditional style of total number of lines per frame (525 and 625) has been used. For high-definition material, the new convention of active lines per frame (720 and 1080) has been used
- 2) The terminology for MPEG video streams includes “MPEG” when describing an arbitrary MPEG video type. The terms “MPEG-1” and “MPEG-2” are used when a specific version of MPEG is required. MPEG-1 video is always standard definition. When a MPEG-2 stream is standard definition video in either the 525 or 625 format, the term “MPEG-2 SD” is used. Finally “MPEG-2 HD” is used when a MPEG-2 stream is a high definition video stream. GXF MPEG video streams are always encoded as single frames of MPEG Elementary Stream video elements.

4.1 clip: Clips shall consist of collections of time code, audio, and compressed video tracks. The contents of the tracks determine whether the material is a simple clip or a compound clip. See also simple clip and compound clip.

4.2 compound clip: In a compound clip, each track may be comprised of one or more segments arranged in a specified sequence as shown in Figure 1. Each segment of material on a track of a compound clip shall originate from a single source media file. Segments may comprise all or part of the material from a source media file. If only part of the material is used, it shall be a single contiguous segment delimited by a mark in and a mark out point. Transitions between segments shall be cut transitions.

Video track 1	Media segment V1	Media segment V2
Audio track 1	Media segment A1	Media segment A3
Audio track 2	Media segment A2	Media segment A4
Time code	Media segment T1	

Figure 1 – Example of a compound clip

4.3 data types: Table 1 describes the data types used in this Standard.

Numerical values in this Standard that are preceded by 0x are hexadecimal values. All other numerical values are decimal numbers.

Table 1 – Data type descriptions

Data type	Description
BINARY	8-bit binary data without an implicit length
INT32	32-bit signed integer
UINT64	64-bit unsigned integer
UINT32	32-bit unsigned integer
UINT16	16-bit unsigned integer
UINT8	8-bit unsigned integer
CHARACTER	A single character code using ANSI INCITS 4-1986
STRING	An ordered vector of ANSI INCITS 4-1986 coded characters that is 0x00 (NULL) terminated. NOTE: Unicode is not allowed.
FLOAT64	64-bit signed floating point (see IEEE 754)

The byte order for multibyte values defined in this Standard shall be the least significant byte (LSB) first, followed by progressively more significant bytes to the most significant byte (MSB) unless otherwise specified. Multibyte values in predefined items such as MPEG and DV compressed video streams shall be as stored/transported in their native order.

4.4 field identifier: The field identifier indicates the field number within the associated video frame:

- 1 = Field 1
- 2 = Field 2

For interlaced video, the field identifier alternates between 1 and 2. For progressive video, the field identifier is 1 on every field/frame.

Note: The field 1/2 nomenclature is always used, even when traditional standards would use field 0/1.

4.5 field locator table: The optional field locator table (FLT) provides a method to locate the desired material in the stream without processing the entire stream. The FLT shall contain up to 1000 offsets into the stream, which can be used to locate a point in the stream near a specified field. If an FLT is not present, unneeded fields or frames may have to be processed in order to locate the desired field or frame. The FLT facilitates partial file transfers from devices such as data tape archives by providing the ability to locate the desired portion of the streamed material without reading the entire stream.

4.6 field number: An unsigned integer that designates the position of a video field on a playout time line. The field number time line shall be zero-based and increment with each field. Frame based compression systems shall represent frames numbers with even field numbers.

4.7 field and frame rates: The field rate for 625-line material is exactly 50 fields per second. The field rate for 525-line material is documented as 59.94 fields per second. The actual field rate is 60/1.001 fields per second. The field rate for 1080-line interlaced material can be 60 fields/sec, 59.94 (the exact rate is 60/1.001)

fields/sec, or 50 fields/sec. The field rate for 1080-line progressive material can be 30 frames/sec, 29.97 (the exact rate is 30/1.001) frames/sec, 25 frames/sec, 24 frames/sec, or 23.98 (the exact rate is 24/1.001) frames/sec. The field rate for 720-line material can be 50 frames/sec, 60 frames/sec, or 59.94 (the exact rate is 60/1.001) frames/sec (see SMPTE 292, Table 1).

4.8 first field number: The first field number shall represent the position on a playout time line of the first recorded field on a track (see field number above).

Note: The first/last field numbers describe the recorded material on a track. The mark in/out field numbers delimit the active (played) portion of a track.

4.9 last field number: The last field number shall represent the position on a playout time line of the last recorded field plus one (see field number above).

4.10 map packet: The map packet contains information (metadata) describing segments and tracks in a stream. The map packet includes information such as the type of each track and the media file name. Map packets shall be repeated in the stream. Map packet values may change within a stream. Examples of values that may change include media file names in the case of compound clips, and the size of the stream if the material is streamed while being recorded.

4.11 mark in field number: The mark in field number shall represent the position on a playout time line of the first field to be played from a track (see field number above).

Note: The mark in/out field numbers delimit the active (played) portion of a track. The first/last field numbers describe the material recorded for a given track.

4.12 mark out field number: The mark out field number shall represent the position on a playout time line of the last field to be played plus one (see field number above).

4.13 material: Material is a collection of audio, video, time codes, data, and synchronization information that may be source or finished content.

4.14 media file: A media file conceptually defines the storage format of a single track on a source or receiving device. The format of this file is not specified in this Standard. Conformance with this Standard shall only require a logical media file to be capable of providing or accepting the video, audio, time code, or data values and their associated time line positions or synchronization information.

Note: A compliant media file can be generated by an encoder, received by a decoder, stored on a file storage system, or processed by any other device that can provide or accept material.

4.15 media file name: A media file name shall be a string with the name of the media file on the source device that contains the material. The null media file name shall be used for segments that have not been recorded or otherwise provided. A null media file name shall have a 0x00 (NULL) as its first character. Receiving devices may use media file names at their discretion.

4.16 media packet: The stream packet that contains audio sample words, time code entries, or a field or frame of compressed video. Any audio or time code packet may have unused entries if there are unrecorded sections in the clip.

4.17 PCM audio: Linearly digitized audio samples represented in two's complement integers. The integer sample size varies.

4.18 receiver: The receiver is the device that receives a streaming transfer. The receiver may store the stream as is, convert it another format, display the contents of the stream, or perform other functions.

4.19 reserved codes: These are code values that should not be emitted by a source and shall be ignored by a receiver.

4.20 reserved tags: These are tag values that should not be emitted by a source and shall be ignored by a receiver.

4.21 reserved values: These are data values that should be coded as zero by a source unless otherwise indicated. A receiver shall ignore these.

4.22 segment: A single contiguous set of audio samples, time code values, or video fields or frames of material. The boundaries of a segment shall be defined by the mark in and mark out field numbers. A segment may reference material that is outside the bounds of the first and last field numbers of the track.

4.23 simple clip: In a simple clip, each track shall be comprised of a single segment as shown in Figure 2. The content on any track shall originate from a single source media file.

Video track 1	Media segment V1
Audio track 1	Media segment A1
Audio track 2	Media segment A2
Time code	Media segment T1

Figure 2 – Example of a simple clip

4.24 source: The source is the device that provides or generates the stream.

4.25 striped time codes: Striped time codes are a virtual track of time codes that are calculated given a starting time code value and successive frame numbers.

4.26 track: A track is an ordered collection of material samples. Each sample represents a video field, a video frame, an audio sample, or a time code. Each sample includes an actual or logical playout or presentation time. A track is not required to have samples at every sample time slot.

4.27 time line: A time line defines the playout or presentation time of video, audio, data, and time codes.

4.28 under construction: The collection of media files on a source device are considered to be under construction when a copy is transferred while the original is being recorded or being created by another concurrent file transfer operation.

4.29 unified material format: The unified material format (UMF) packets provide a description of the streamed material. The UMF includes the equivalent of an edit decision list, which allows a compound clip composed of several segments to be included in a single stream. This is not a complete SMPTE EDL (SMPTE 258M). The UMF also includes all user data associated with the material.

4.30 uniform media locator: A uniform media locator (UML) shall describe the location of the material to be streamed on a source or receiver device. UMLs are similar in concept to the universal resource locator (URL) scheme used with HTTP on the Internet.

4.31 user data: Information that the user chooses to associate with the material. This may include descriptive text, user-defined metadata, user-defined edit decision information, or any other information that the user chooses. User data is contained in the UMF packets.

Note: User data can be encoded using SMPTE metadata encapsulation techniques (SMPTE 336M encoding and SMPTE RP 210 dictionary).

4.32 vector: A single dimensional ordered set of items.

5 Stream Composition

Using streaming to transfer material allows the transferred material to be used at the receiver while the material is still being transferred from the source. Similarly, material may be transferred from the source while it is still being recorded. This is accomplished by packet multiplexing all of the material types.

5.1 Overall Stream Sequence

All information in the stream is contained in packets. A packet shall consist of a header and a payload. Packets shall be a multiple of 4 bytes in length. Each packet shall start with a packet header. The header shall identify the information contained in the packet's payload and the payload length. The packet header shall include leader and trailer bytes.

Every stream shall start with a map packet, shall include at least one unified material format (UMF) packet, and end with an end of stream (EOS) packet. The material being streamed determines the type and position of any additional packets. The packet order for a stream is shown in Figure 3.

A field locator table (FLT) should be included in the stream. Receiving devices shall not depend on the presence of an FLT for correct operation. No more than one FLT shall be included in a stream. If present, the position of the FLT shall be determined by the status of the material (under construction or not) on the source system. Streams generated when the material is not under construction shall have the optional FLT placed immediately after the first map packet. If the material is under construction while the stream is being created, the optional FLT shall be immediately prior to the EOS packet.

Note: This Standard recommends all streams contain an FLT. However, in some cases such as an implementation of a partial retrieve from a data tape archive, construction of an FLT could be difficult and will add limited value. Therefore, this Standard does not require an FLT.

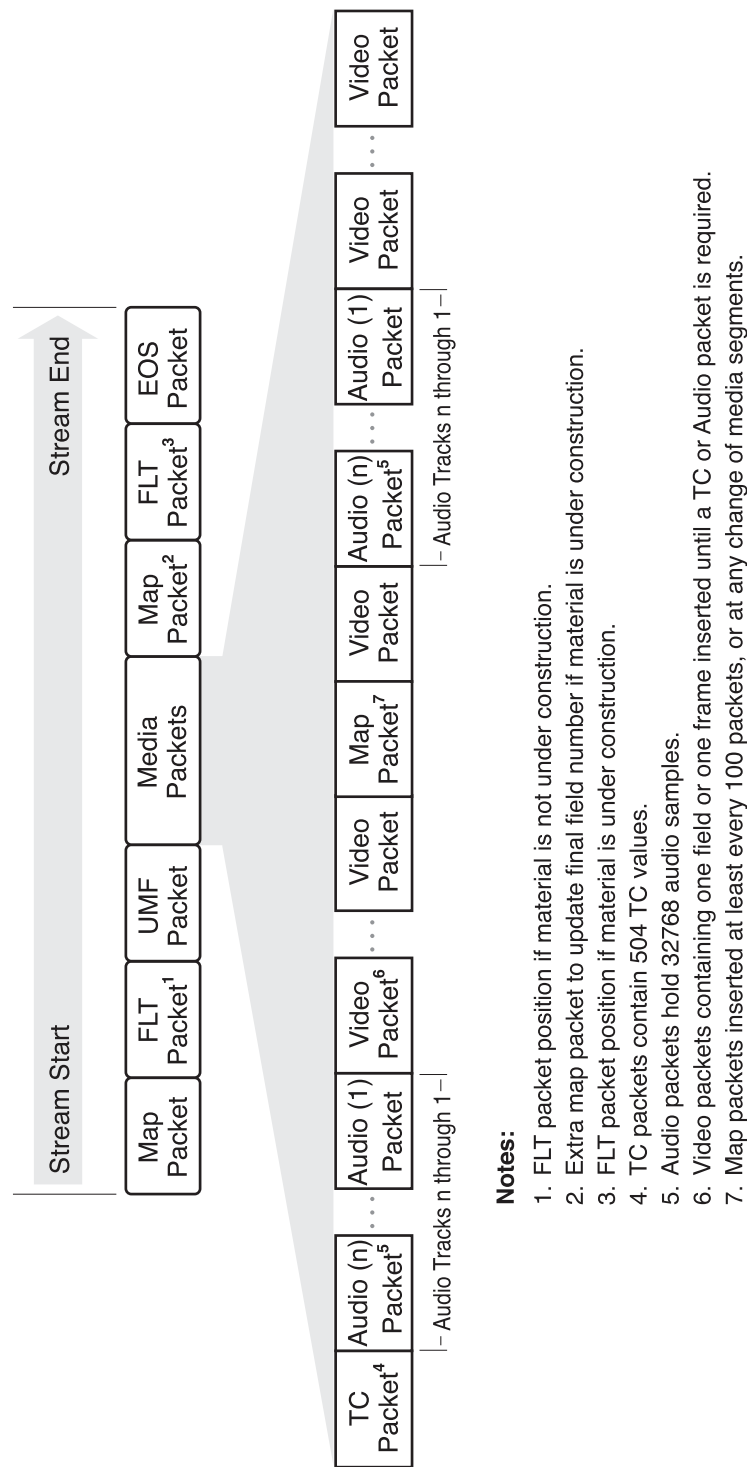


Figure 3 – Packet order in stream

5.2 Sequence of MAP Packets and Active Material Media Packets

Media packets shall contain one field or frame of video, a vector of audio sample words, or a vector of time code values. The video, audio, and time code media packets shall be interleaved (time multiplexed) in the stream in a manner that allows the material to be played while the stream is being received. Video, audio, and time code packets shall only be inserted in the stream if they contain material.

All audio, and time code packets, including the first and last packets, shall include a complete set of sample locations. Audio, and time code packets may have unused (unrecorded) sample locations in the first packet (at the start of material on a track) or at the end of the last packet (at the end of material on a track).

The mapping between a sample's location in a packet and the sample's playout or presentation time is always maintained, even if part of the packet contains unrecorded samples.

Note: Additional information on audio and time code packet formatting, synchronization, and stream construction can be found in clause 7.4 and Annex B.

A source device may record time codes as media tracks. Recorded time code tracks may include invalid values and discontinuities in the time line they represent.

Time code packets, if present, shall be placed in the stream before audio packets. In turn, audio packets, if present, shall be placed in the stream before active video packets for the current field. This guarantees that all the time code, and audio information is available to the receiver device before the playable video field or frame. Media packets shall be inserted in the stream in a sequence such that all packets needed to play a given video field or frame are available by the time the track 0 (video) packet arrives.

A map packet shall be present in the stream at least every 100 packets. These recurring map packets allow playout of a stream "joined in progress". They also allow for the recovery of part of the material if earlier parts of the stream were unreadable.

If a simple clip is streamed and the material is not under construction, the additional map packets shall be duplicates of the first one in the stream. If a simple clip is streamed and the material is under construction, the additional map packets may differ from all the preceding map packets. Successive map packets should contain the correct (current) last field number.

A closing MAP packet shall be inserted after the last media packet if the stream being transferred was under construction. This MAP packet shall contain the correct last field number value.

Video, audio and time code packets that have no active material shall not be inserted into the stream. Partially recorded audio and time code packets shall be inserted in the stream when the material starts or stops at boundaries that are not packet boundaries.

Note: The recommended playout behavior is missing video will be presented as black, missing audio will be presented as silence, and missing time codes values will not be present in the output stream. This is not a file/stream format policy choice and therefore this recommendation is not part of this Standard.

5.3 Decoder Pre-charge Media Packets

Some audio and video compression systems require additional information to pre-charge decoders or successfully complete the playout of a track at cuts or the start or end points. These packets shall be placed in timeline sequence for their respective track. Decoder pre-charge or completion packets may not be in the correct stream position in relationship to the other tracks media packets.

5.4 Sequence of Media Packets for Compound Clips

The active material in a compound clip shall be transferred as if it was a simple clip (see clause 5.2).

Additional map packets shall be included at least every 100 packets. In addition, new map packets shall be present when the media file used for any given track changes.

Notes:

- 1) The additional MAP packets allow a stream of compound clips to be thought of as a sequence of simple clips.
- 2) A long GOP MPEG video stream usually needs additional media packets at the transitions to precharge the playout decoders.

Inactive material packets (handles) shall be transferred after the active material. Media packets shall be sent in timeline order within each track. The sequencing of tracks for unseen material is not specified in this Standard.

5.5 Mixed Media Tracks in Compound Clips (Informative)

A detailed specification of source and receiver device implementation strategies for processing complex files is beyond the scope of this Standard. This section offers some guidance to source and receiver implementers. For example, the source and receiving devices must have appropriate audio, video, and time code codecs.

The source of compound clips should not generate streams with media type transitions on a track that the receiver cannot process or display. Transitions for field and frame based compression systems is relatively simple. Transitions for tracks containing material from temporal compression systems may require multiple decoders to correctly play the exact sequence of frames specified in the stream.

The source stream may need overlapping material at transitions. In a long GOP MPEG stream the stream must have “pre-charge” frames starting with a closed GOP I-frame. Including a sequence header and extension with each GOP will improve interoperability.

A stream that includes material from multiple compression families requires decoders for each compression family; overlapping material may be needed in the stream for temporal compression systems. In addition, decoder-to-decoder output stream switching may be required in the receiver.

MPEG material is represented as an MPEG Elementary Stream. This minimizes the difficulties normally associated with cutting MPEG material. When MPEG ES streams are converted to Transport Streams several additional constraints are placed on the stream. An example is the requirement to meet MPEG buffer fullness requirements.

6 Packet Headers

Each packet shall begin with a packet header as shown in Figure 4.

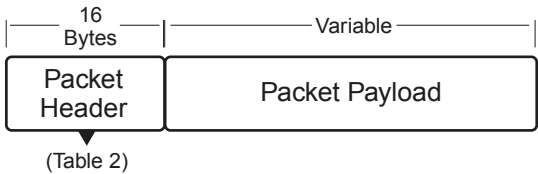


Figure 4 – Packet header

Each packet header shall consist of 16 bytes. A packet header shall contain a 5-byte leader and a 2-byte trailer as part of the packet header. The packet header shall include the packet type and the packet length. The specified packet length shall be in bytes and shall include the length of the packet header. The contents of a packet header shall be as shown in Table 2.

Table 2 – Packet header description

Offset	Value	Usage
0x00	0x00	Packet leader
0x01	0x00	
0x02	0x00	
0x03	0x00	
0x04	0x01	
0x05	Variable	Packet type: 0xBC = map 0xBF = media 0xFA = reserved 0xFB = end of stream 0xFC = field locator table 0xFD = UMF file 0xFE = reserved 0xFF = reserved Source devices should not generate reserved packet types. Receivers shall ignore packets with these packet types.
0x06	Variable	Packet length in bytes, including the 16-byte header. This shall be a 32-bit unsigned integer encoded most significant byte first.
0x0A	0x00	Reserved
0x0B	0x00	
0x0C	0x00	
0x0D	0x00	
0x0E	0xE1	Packet trailer
0x0F	0xE2	

7 Packet Type Descriptions

The following clauses describe the various packet types and their contents.

7.1 Map Packets

Map packets contain all the information about the subsequent media packets that is required to store the packets in appropriate media files and set their attributes. Map packets shall also include a current description of the streamed material. These values shall reflect the changing description over time if the material is under construction.

The map packet may be used by the receiver to identify material segments and track information for those segments.

The map packet shall include the type of each track in the material, the media file names, and other information described in the following clauses. Not all values are present in all map packets. Missing values shall default to 0 for numeric values and the null string (0x00) for text values. Certain map packet values may change within a stream. Examples are media file names (for compound clips) and the size of the stream (material streamed while being recorded).

Map packets do not contain a complete definition of the streamed material. The complete material definition shall be contained in the unified material format packet (see clause 7.3).

A map packet shall have two sections: a header and a payload (see Figure 5).

7.1.1 Map Packet Header

The map packet header shall take the form of a packet header described in clause 6 of this Standard.

Refer to Table 2 to identify the packet type code for a map packet.

7.1.2 Map Packet Payload

The map packet payload shall consist of three sections; a fixed length preamble, a variable-length material data section that contains update information common to the entire file, and a variable-length track description section that describes the material tracks.

A map packet may have fill bytes following the track descriptions. The packet header defines the length of the map packet payload. The size of the preamble is fixed and the sizes of the material data section and the track description section shall be given in their respective headers. The size of all payload components shall be less than or equal to the map packet payload length.

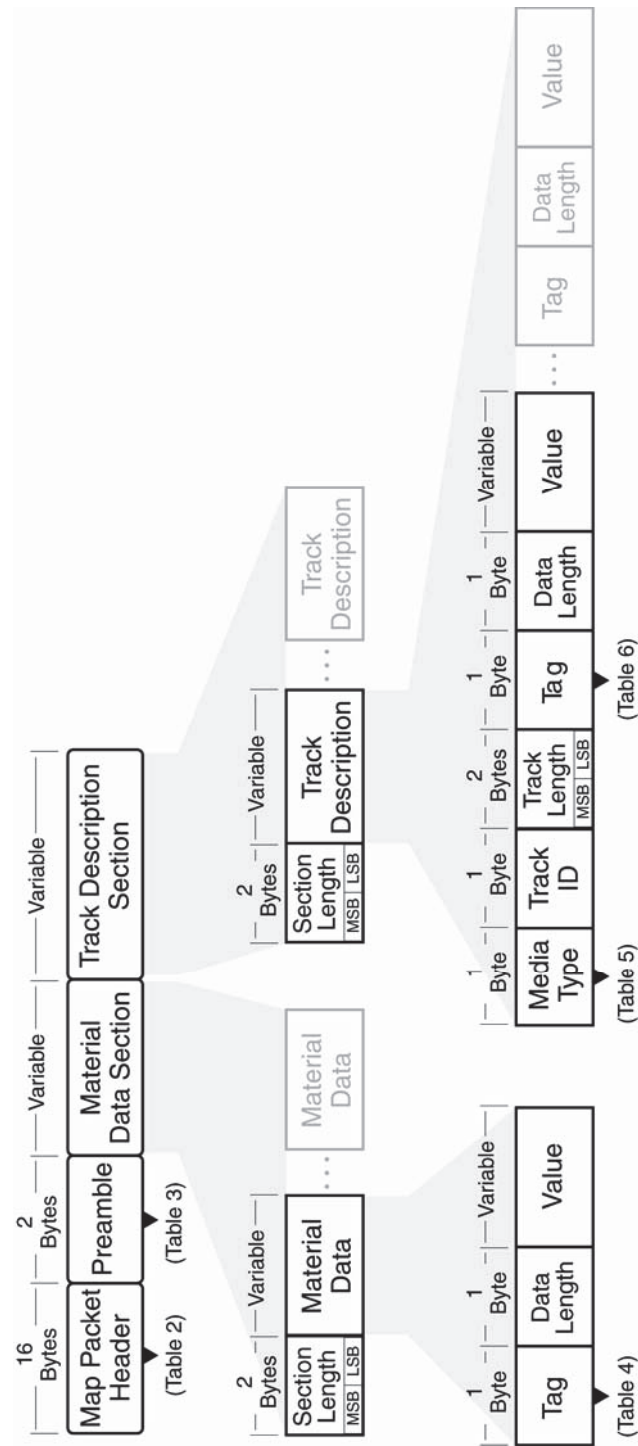


Figure 5 – Map packet composition

7.1.2.1 Map packet preamble

The map packet preamble shall have a fixed length and shall contain the two bytes shown in Table 3.

Table 3 – Map packet preamble

Offset	Contents	Description
0x00	0xE0	The low-order 5 bits of byte 0 shall be the version number of the stream format. This Standard describes version 0. The high order 3 bits shall be 1s.
0x01	0xFF	This byte is reserved for future use and shall be coded as a 0xFF by a source.

7.1.2.2 Material data section

The variable-length material data section shall have its byte length defined at the start of the section. The length value shall not include itself and is in units of bytes. The length value shall be a 16-bit unsigned integer with the most significant byte preceding the least significant byte.

The material data section contains a variable number of variable-length data values. Each data value contains one attribute of the stream. All data values shall be of the following format:

Tag	Length	Value Bytes
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The tag value identifies the data. The tags and the associated types are listed in Table 4.

The length value contains the length of the value in bytes; it does not include itself or the tag value.

The tag and length are one byte each.

Value bytes shall be streamed with the most significant byte first, followed by progressively less significant bytes.

7.1.2.3 Tag values, type, length and usage

Table 4 describes the tags used to identify the material data values.

Table 4 – Tag descriptions

Tag	Data type	Description
0x40	STRING	Media file name of material
0x41	UINT32	First field of material in stream (inclusive)
0x42	UINT32	Last field of material in stream (exclusive)
0x43	UINT32	Mark in for the stream (inclusive)
0x44	UINT32	Mark out for the stream (exclusive)
0x45	UINT32	Estimated size of stream in 1024 byte units
0x46	UINT32	Reserved
0x47	UINT64	Reserved
0x48	STRING	Reserved
0x49	STRING	Reserved
0x4A	STRING	Reserved
0x4B	STRING	Reserved

Media file name: A string with the media file name from the source device.

First and last field: The numbers of the first field (inclusive) and last field (exclusive) of the material contained in the stream.

The field number is the time line position of the field. If a segment is being streamed, the first and last field values shall be the segment start field number (inclusive) and the segment end field number (exclusive). If the stream is being created while the material is being recorded, the last field value shall increase as the material is recorded. The last field value in the first map packet will be the last recorded field at the time the stream was started. Subsequent map packets shall have an updated last field value.

There shall be a map packet after the last media packet containing the final value for the last field.

Mark in and mark out: The mark in and mark out field numbers for this stream.

Estimated size: The space estimate shall be calculated by the source when the stream is started. The space estimate shall be specified in units of 1024 bytes. If the stream is being created while the material is still being recorded, the space estimate shall be 0.