

INTERNATIONAL
STANDARD

ISO/IEC
13818-1

Seventh edition
2019-06

AMENDMENT 1
2020-01

**Information technology — Generic
coding of moving pictures and
associated audio information —**

**Part 1:
Systems**

iTeh STANDARD REVIEW
AMENDMENT 1: Carriage of JPEG XS in
MPEG-2 TS
(standards.iteh.ai)

*Technologies de l'information — Codage générique des images
animées et du son associé —*
ISO/IEC 13818-1:2019/Amd.1:2020
<https://standards.iteh.ai/catalog/standards/sist/704978ae-8b9b-4123-8d5e-ae46b1042019/amd.1:2020>

AMENDEMENT 1: Transfert de JPEG XS en MPEG-2 TS



Reference number
ISO/IEC 13818-1:2019/Amd.1:2020(E)

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Published in Switzerland

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This document was prepared by ITU-T as ITU-T H.222.0 (08/2018) and drafted in accordance with its editorial rules. It was assigned to Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – Generic coding of moving pictures and associated audio information: Systems

Amendment 1

Carriage of JPEG XS in MPEG-2 TS

1) Clause 1.2.3

In clause 1.2.3, Additional References, add the following references:

- ISO/IEC 21122-1:2019, *JPEG XS low-latency lightweight image coding system – Part 1: Core coding system.*
- ISO/IEC 21122-2:2019, *JPEG XS low-latency lightweight image coding system – Part 2: Profiles and buffer models.*
- ISO/IEC 21122-3:2019, *JPEG XS low-latency lightweight image coding system – Part 3: Transport and container formats.*
- ISO/IEC 23091-2:2019, *Coding-independent code points – Part 2: Video.*

2) Clauses 2.1.77bis to 2.1.77sexies

**The STANDARD PREVIEW
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After clause 2.1.77, add the following clauses 2.1.77bis to 2.1.77sexies:

2.1.77bis JPEG XS elementary stream header (jxes header): All parameters required to decode a JPEG XS video access unit and display the decoded data.

2.1.77ter JPEG XS still picture (system): JPEG XS video access unit as defined in 2.1.77quater with constraints as specified in W.2. [ISO/IEC 13818-1:2019/Amd.1:2020
 https://standards.iteh.ai/catalog/standards/sist/704978ae-8b9b-4123-8d5e-ae46b104836/iso-iec-13818-1-2019-amd-1-2020](https://standards.iteh.ai/catalog/standards/sist/704978ae-8b9b-4123-8d5e-ae46b104836/iso-iec-13818-1-2019-amd-1-2020)

2.1.77quater JPEG XS video access unit: The JPEG XS codestream or multiple JPEG XS codestreams, as defined in ISO/IEC 21122-1, comprising a decodable and randomly accessible image, preceded by a JPEG XS elementary stream header.

2.1.77quinquies JPEG XS video elementary stream: Video elementary stream consisting of a succession of JPEG XS video access units.

2.1.77sexies JPEG XS video sequence: JPEG XS video elementary stream where all the access units have the same profile, level and sublevel (as defined in ISO/IEC 21122-2), JPEG XS video access unit coding parameters, and video parameters.

3) Clause 2.4.2.15

After clause 2.4.2.14, add the following clause 2.4.2.15:

2.4.2.15 T-STD extensions for carriage of JPEG XS video elementary streams

The interpretation, extensions, use and constraints for syntax elements in the adaptation header (2.4.3.4 and 2.4.3.5) for JPEG XS Part-1 video are defined in W.5.

The interpretation, extensions, use and constraints for syntax elements in the PES header (2.4.3.6 and 2.4.3.7) for JPEG XS Part-1 video are defined in W.5.

To define the decoding of JPEG XS video elementary streams carried in a Transport Stream, the T-STD model needs to be extended. The T-STD extensions and T-STD parameters for decoding of JPEG XS video elementary streams conforming to one or more profiles defined in ISO/IEC 21122-2 are defined in W.6.

NOTE – No extensions are specified for P-STD model, as carriage of JPEG XS video elementary streams in program streams is not supported.

4) Clause 2.4.3.7

In clause 2.4.3.7, replace Table 2-22 with the following:

Table 2-22 – Stream_id assignments

Stream_id	Note	stream coding
'1011 1100'	1	program_stream_map
'1011 1101'	2,9,10,11	private_stream_1
'1011 1110'		padding_stream
'1011 1111'	3	private_stream_2
'110x xxxx'		ISO/IEC 13818-3 or ISO/IEC 11172-3 or ISO/IEC 13818-7 or ISO/IEC 14496-3 or ISO/IEC 23008-3 audio stream number 'x xxxx'
'1110 xxxx'		Rec. ITU-T H.262 ISO/IEC 13818-2, ISO/IEC 11172-2, ISO/IEC 14496-2, Rec. ITU-T H.264 ISO/IEC 14496-10 or Rec. ITU-T H.265 ISO/IEC 23008-2 video stream number 'xxxx'
'1111 0000'	3	ECM_stream
'1111 0001'	3	EMM_stream
'1111 0010'	5	Rec. ITU-T H.222.0 ISO/IEC 13818-1 Annex A or ISO/IEC 13818-6_DSMCC_stream
'1111 0011'	2	ISO/IEC_13522_stream
'1111 0100'	6	Rec. ITU-T H.222.1 type A
'1111 0101'	6	Rec. ITU-T H.222.1 type B
'1111 0110'	6	Rec. ITU-T H.222.1 type C
'1111 0111'	6	Rec. ITU-T H.222.1 type D
'1111 1000'	6	Rec. ITU-T H.222.1 type E
'1111 1001'	7	ancillary_stream
'1111 1010'		ISO/IEC 14496-1_SI_packetized_stream
'1111 1011'		ISO/IEC 14496-1_FlexMux_stream
'1111 1100'		ISO/IEC 13818-1:2019/Amd 1:2020 metadata stream
'1111 1101'		https://standards.itehaindonesia.id/standards/list/704978ae-8b9b-4123-8d5e-ae46b104836/iso-iec-13818-1-2019-amd-1-2020
'1111 1110'		extended_stream_id reserved data stream
'1111 1111'	4	program_stream_directory

The notation x means that the values '0' or '1' are both permitted and results in the same stream type. The stream number is given by the values taken by the x's.

NOTE 1 – PES packets of type program_stream_map have unique syntax specified in 2.5.4.1.

NOTE 2 – PES packets of type private_stream_1 and ISO/IEC_13552_stream follow the same PES packet syntax as those for Rec. ITU-T H.262 | ISO/IEC 13818-2 video and ISO/IEC 13818-3 audio streams.

NOTE 3 – PES packets of type private_stream_2, ECM_stream and EMM_stream are similar to private_stream_1 except that no syntax is specified after PES_packet_length field.

NOTE 4 – PES packets of type program_stream_directory have a unique syntax specified in 2.5.5.

NOTE 5 – PES packets of type DSM-CC_stream have a unique syntax specified in ISO/IEC 13818-6.

NOTE 6 – This stream_id is associated with stream_type 0x09 in Table 2-34.

NOTE 7 – This stream_id is only used in PES packets, which carry data from a program stream or an ISO/IEC 11172-1 System Stream, in a transport stream (refer to 2.4.3.8).

NOTE 8 – The use of stream_id 0xFD (extended_stream_id) identifies that this PES packet employs an extended syntax to permit additional stream types to be identified.

NOTE 9 – JPEG 2000 video streams (stream_type = 0x21) are carried using the same PES packet syntax as private_stream_1.

NOTE 10 – Timeline and External Media Information streams (stream_type = 0x27) are carried using the same PES packet syntax as private_stream_1.

NOTE 11 – JPEG XS video streams (stream_type = 0x32) are carried using the same PES packet syntax as private_stream_1.

5) Clause 2.4.4.10, Table 2-34

In clause 2.4.4.10, Semantic definition of fields in Transport Stream program map section, replace Table 2-34 with the following:

Table 2-34 – Stream type assignments

Value	Description
0x00	ITU-T ISO/IEC Reserved
0x01	ISO/IEC 11172-2 Video
0x02	Rec. ITU-T H.262 ISO/IEC 13818-2 Video or ISO/IEC 11172-2 constrained parameter video stream (see Note 2)
0x03	ISO/IEC 11172-3 Audio
0x04	ISO/IEC 13818-3 Audio
0x05	Rec. ITU-T H.222.0 ISO/IEC 13818-1 private_sections
0x06	Rec. ITU-T H.222.0 ISO/IEC 13818-1 PES packets containing private data
0x07	ISO/IEC 13522 MHEG
0x08	Rec. ITU-T H.222.0 ISO/IEC 13818-1 Annex A DSM-CC
0x09	Rec. ITU-T H.222.1
0x0A	ISO/IEC 13818-6 type A
0x0B	ISO/IEC 13818-6 type B
0x0C	ISO/IEC 13818-6 type C
0x0D	ISO/IEC 13818-6 type D
0x0E	Rec. ITU-T H.222.0 ISO/IEC 13818-1 auxiliary
0x0F	ISO/IEC 13818-7 Audio with ADTS transport syntax
0x10	ISO/IEC 14496-2 Visual
0x11	ISO/IEC 14496-3 Audio with the LATM transport syntax as defined in ISO/IEC 14496-3
0x12	ISO/IEC 14496-1 SL-packetized stream or FlexMux stream carried in PES packets
0x13	ISO/IEC 14496-1 SL-packetized stream or FlexMux stream carried in ISO/IEC 14496_sections
0x14	ISO/IEC 13818-6 Synchronized Download Protocol
0x15	Metadata carried in PES packets
0x16	Metadata carried in metadata_sections
0x17	Metadata carried in ISO/IEC 13818-6 Data_Carousel
0x18	Metadata carried in ISO/IEC 13818-6 Object Carousel
0x19	Metadata carried in ISO/IEC 13818-6 Synchronized Download Protocol
0x1A	IPMP stream (defined in ISO/IEC 13818-11, MPEG-2 IPMP)
0x1B	AVC video stream conforming to one or more profiles defined in Annex A of Rec. ITU-T H.264 ISO/IEC 14496-10 or AVC video sub-bitstream of SVC as defined in 2.1.10 or MVC base view sub-bitstream, as defined in 2.1.89, or AVC video sub-bitstream of MVC, as defined in 2.1.8 or MVCD base view sub-bitstream, as defined in 2.1.94, or AVC video sub-bitstream of MVCD, as defined in 2.1.9, or AVC base layer of an HEVC video stream conforming to one or more profiles defined in Annex G or Annex H of Rec. ITU-T H.265 ISO/IEC 23008-2
0x1C	ISO/IEC 14496-3 Audio, without using any additional transport syntax, such as DST, ALS and SLS
0x1D	ISO/IEC 14496-17 Text
0x1E	Auxiliary video stream as defined in ISO/IEC 23002-3
0x1F	SVC video sub-bitstream of an AVC video stream conforming to one or more profiles defined in Annex G of Rec. ITU-T H.264 ISO/IEC 14496-10
0x20	MVC video sub-bitstream of an AVC video stream conforming to one or more profiles defined in Annex H of Rec. ITU-T H.264 ISO/IEC 14496-10
0x21	Video stream conforming to one or more profiles as defined in Rec. ITU-T T.800 ISO/IEC 15444-1
0x22	Additional view Rec. ITU-T H.262 ISO/IEC 13818-2 video stream for service-compatible stereoscopic 3D services (see Notes 3 and 4)
0x23	Additional view Rec. ITU-T H.264 ISO/IEC 14496-10 video stream conforming to one or more profiles defined in Annex A for service-compatible stereoscopic 3D services (see Notes 3 and 4)
0x24	Rec. ITU-T H.265 ISO/IEC 23008-2 video stream or an HEVC temporal video sub-bitstream (see Note 5)
0x25	HEVC temporal video subset of an HEVC video stream conforming to one or more profiles defined in Annex A of Rec. ITU-T H.265 ISO/IEC 23008-2

Table 2-34 – Stream type assignments

Value	Description
0x26	MVCD video sub-bitstream of an AVC video stream conforming to one or more profiles defined in Annex I of Rec. ITU-T H.264 ISO/IEC 14496-10
0x27	Timeline and External Media Information Stream (see Annex U)
0x28	HEVC enhancement sub-partition which includes TemporalId 0 of an HEVC video stream where all NALs units contained in the stream conform to one or more profiles defined in Annex G of Rec. ITU-T H.265 ISO/IEC 23008-2
0x29	HEVC temporal enhancement sub-partition of an HEVC video stream where all NAL units contained in the stream conform to one or more profiles defined in Annex G of Rec. ITU-T H.265 ISO/IEC 23008-2
0x2A	HEVC enhancement sub-partition which includes TemporalId 0 of an HEVC video stream where all NAL units contained in the stream conform to one or more profiles defined in Annex H of Rec. ITU-T H.265 ISO/IEC 23008-2
0x2B	HEVC temporal enhancement sub-partition of an HEVC video stream where all NAL units contained in the stream conform to one or more profiles defined in Annex H of Rec. ITU-T H.265 ISO/IEC 23008-2
0x2C	Green access units carried in MPEG-2 sections
0x2D	ISO/IEC 23008-3 Audio with MHAS transport syntax – main stream
0x2E	ISO/IEC 23008-3 Audio with MHAS transport syntax – auxiliary stream
0x2F	Quality access units carried in sections
0x30	Media Orchestration Access Units carried in sections
0x31	Substream of a Rec. ITU-T H.265 ISO/IEC 23008-2 video stream that contains a Motion Constrained Tile Set, parameter sets, slice headers or a combination thereof. See 2.17.5.1.
0x32	JPEG XS video stream conforming to one or more profiles as defined in ISO/IEC 21122-2
0x33 .. 0x7E	Rec. ITU-T H.222.0 ISO/IEC 13818-1 reserved
0x7F	IPMP stream
0x80 .. 0xFF	User Private ISO/IEC 13818-1:2019/Amd.1:2020

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6) Clause 2.6.90, Table 2-107

In clause 2.6.90, Extension descriptor, replace Table 2-107 with:

Table 2-107 – Extension descriptor

Syntax	No. of bits	Mnemonic
<pre>Extension_descriptor () { descriptor_tag descriptor_length extension_descriptor_tag if (extension_descriptor_tag == 0x02) { ObjectDescriptorUpdate() } else if (extension_descriptor_tag == 0x03) { HEVC_timing_and_HRD_descriptor() } else if (extension_descriptor_tag == 0x04) { af_extensions_descriptor () } else if (extension_descriptor_tag == 0x05) { HEVC_operation_point_descriptor() } else if (extension_descriptor_tag == 0x06) {</pre>	8 8 8	uimsbf uimsbf uimsbf

Table 2-107 – Extension descriptor

Syntax	No. of bits	Mnemonic
<pre> HEVC_hierarchy_extension_descriptor() } else if (extension_descriptor_tag == 0x07) { Green_extension_descriptor() } else if (extension_descriptor_tag == 0x08) { MPEG-H_3dAudio_descriptor() } else if (extension_descriptor_tag == 0x09) { MPEG-H_3dAudio_config_descriptor() } else if (extension_descriptor_tag == 0x0A) { MPEG-H_3dAudio_scene_descriptor() } else if (extension_descriptor_tag == 0x0B) { MPEG-H_3dAudio_text_label_descriptor() } else if (extension_descriptor_tag == 0x0C) { MPEG-H_3dAudio_multi-stream_descriptor() } else if (extension_descriptor_tag == 0x0D) { MPEG-H_3dAudio_drc_loudness_descriptor() } else if (extension_descriptor_tag == 0x0E) { MPEG-H_3dAudio_command_descriptor() } else if (extension_descriptor_tag == 0x0F) { Quality_extension_descriptor() } else if (extension_descriptor_tag == 0x10) { Virtual_segmentation_descriptor() } else if (extension_descriptor_tag == 0x11) { timed_metadata_extension_descriptor() } else if (extension_descriptor_tag == 0x12) { HEVC_tile_substream_descriptor() } else if (extension_descriptor_tag == 0x13) { HEVC_subregion_descriptor() } else if (extension_descriptor_tag == 0x14) { JXS_video_descriptor() } else { for (i=0; i<N; i++) { reserved } } } </pre>	8	bslbf