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

AMENDMENT 2: Support of IPMP on MPEG-2 systems

Technologies de l'information — Codage générique des images animées et du son associé: Systèmes

AMENDEMENT 2: Support de IPMP sur les systèmes MPEG-2

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

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

Amendment 2

Support of IPMP on MPEG-2 systems

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1) Subclause 1.2.3

Insert the following additional reference:

– ISO/IEC 13818-11:2003, *Information technology – Generic coding of moving pictures and associated audio information – Part 11: IPMP on MPEG-2 systems*.

2) Subclause 2.4.1

Replace the following paragraph (with the changes underlined):

The PSI tables are carried in the Transport Stream. There are six PSI tables:

- Program Association Table;
- Program Map Table;
- Conditional Access Table;
- Network Information Table;
- Transport Stream Description Table;
- IPMP Control Information Table.

These tables contain the necessary and sufficient information to demultiplex and present programs. The Program Map Table, in Table 2-28, specifies, among other information, which PIDs, and therefore which elementary streams are associated to form each program. This table also indicates the PID of the Transport Stream packets which carry the PCR for each program. The Conditional Access Table shall be present if scrambling is employed. The Network Information Table is optional and its contents are not specified by this Recommendation | International Standard. The IPMP Control Information Table shall be present if IPMP as described in ISO/IEC13818-11 is used by any of the components in the ITU-T Rec. H.222.0 | ISO/IEC 13818-1 stream.

3) Subclause 2.4.2.3

Replace the first paragraph with the following text:

Complete Transport Stream packets containing system information, for the program selected for decoding, enter the system transport buffer, TBsys, at the Transport Stream rate. These include Transport Stream packets whose PID values are 0, 1, 2 or 3, and all Transport Stream packets identified via the Program Association Table (see Table 2-25) as having the program_map_PID value for the selected program. Network Information Table (NIT) data as specified by the NIT PID is not transferred to TBsys.

NOTE – Size of IPMP Control Information table could be large, and the repetition rate of this table should be adjusted to meet the buffer requirement.

4) Subclause 2.4.3.7

a) Replace Table 2-17 (PES packet) as follows (with the changes highlighted):

Table 2-17 – PES packet

Syntax	No. of bits	Mnemonic
PES_packet() {		
packet_start_code_prefix	**24**	**bslbf**
stream_id	**8**	**uimsbf**
PES_packet_length	**16**	**uimsbf**
if (stream_id != program_stream_map		
&& stream_id != padding_stream		
&& stream_id != private_stream_2		
&& stream_id != ECM		
&& stream_id != EMM		
&& stream_id != program_stream_directory		
&& stream_id != DSMCC_stream		
&& stream_id != ITU-T Rec. H.222.1 type E stream) {		
'10'	**2**	**bslbf**
PES_scrambling_control	**2**	**bslbf**
PES_priority	**1**	**bslbf**
data_alignment_indicator	**1**	**bslbf**
Copyright	**1**	**bslbf**
original_or_copy	**1**	**bslbf**
PTS_DTS_flags	**2**	**bslbf**
ESCR_flag	**1**	**bslbf**
ES_rate_flag	**1**	**bslbf**
DSM_trick_mode_flag	**1**	**bslbf**
Additional_copy_info_flag	**1**	**bslbf**
PES_CRC_flag	**1**	**bslbf**
PES_extension_flag	**1**	**bslbf**
PES_header_data_length	**8**	**uimsbf**
if (PTS_DTS_flags == '10') {		
'0010'	**4**	**bslbf**
PTS [32..30]	**3**	**bslbf**
marker_bit	**1**	**bslbf**
PTS [29..15]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
PTS [14..0]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
}		
if (PTS_DTS_flags == '11') {		
'0011'	**4**	**bslbf**
PTS [32..30]	**3**	**bslbf**
marker_bit	**1**	**bslbf**
PTS [29..15]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
PTS [14..0]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
'0001'	**4**	**bslbf**
DTS [32..30]	**3**	**bslbf**
marker_bit	**1**	**bslbf**
DTS [29..15]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
DTS [14..0]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
}		
if (ESCR_flag == '1') {		
reserved	**2**	**bslbf**
ESCR_base[32..30]	**3**	**bslbf**
marker_bit	**1**	**bslbf**
ESCR_base[29..15]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
ESCR_base[14..0]	**15**	**bslbf**
marker_bit	**1**	**bslbf**
ESCR_extension	**9**	**uimsbf**
marker_bit	**1**	**bslbf**
}		
if (ES_rate_flag == '1') {		
marker_bit	**1**	**bslbf**

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Syntax	No. of bits	Mnemonic
ES_rate	**22**	**uimsbf**
marker_bit	**1**	**bslbf**
}		
if (DSM_trick_mode_flag == '1') {		
trick_mode_control	**3**	**uimsbf**
if (trick_mode_control == fast_forward) {		
field_id	**2**	**bslbf**
intra_slice_refresh	**1**	**bslbf**
frequency_truncation	**2**	**bslbf**
}		
else if (trick_mode_control == slow_motion) {		
rep_cntrl	**5**	**uimsbf**
}		
else if (trick_mode_control == freeze_frame) {		
field_id	**2**	**uimsbf**
reserved	**3**	**bslbf**
}		
else if (trick_mode_control == fast_reverse) {		
field_id	**2**	**bslbf**
intra_slice_refresh	**1**	**bslbf**
frequency_truncation	**2**	**bslbf**
else if (trick_mode_control == slow_reverse) {		
rep_cntrl	**5**	**uimsbf**
}		
Else		
reserved	**5**	**bslbf**
}		
if (additional_copy_info_flag == '1') {		
marker_bit	**1**	**bslbf**
additional_copy_info	**7**	**bslbf**
}		
if (PES_CRC_flag == '1') {		
previous_PES_packet_CRC	**16**	**bslbf**
}		
if (PES_extension_flag == '1') {		
PES_private_data_flag	**1**	**bslbf**
Pack_header_field_flag	**1**	**bslbf**
program_packet_sequence_counter_flag	**1**	**bslbf**
P-STD_buffer_flag	**1**	**bslbf**
reserved	**3**	**bslbf**
PES_extension_flag_2	**1**	**bslbf**
if (PES_private_data_flag == '1') {		
PES_private_data	**128**	**bslbf**
}		
if (pack_header_field_flag == '1') {		
pack_field_length	**8**	**uimsbf**
pack_header()		
}		
if (program_packet_sequence_counter_flag == '1') {		
marker_bit	**1**	**bslbf**
program_packet_sequence_counter	**7**	**uimsbf**
marker_bit	**1**	**bslbf**
MPEG1_MPEG2_identifier	**1**	**bslbf**
original_stuff_length	**6**	**uimsbf**
}		
if (P-STD_buffer_flag == '1') {		
'01'	**2**	**bslbf**
P-STD_buffer_scale	**1**	**bslbf**
P-STD_buffer_size	**13**	**uimsbf**
}		
if (PES_extension_flag_2 == '1') {		
marker_bit	**1**	**bslbf**
PES_extension_field_length	**7**	**uimsbf**
stream_id_extension_flag	**1**	**bslbf**
If (stream_id_extension_flag == '0') {		
stream_id_extension	**7**	**uimsbf**
for (i = 1; i < PES_extension_field_length; i++){		
reserved	**8**	**bslbf**
}		
}		
}		

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Syntax	No. of bits	Mnemonic
}		
for (i < 0; i < N1; i++) {		
stuffing_byte	**8**	**bslbf**
}		
for (i < 0; i < N2; i++) {		
PES_packet_data_byte	**8**	**bslbf**
}		
}		
else if (stream_id == program_stream_map		
|| stream_id == private_stream_2		
|| stream_id == ECM		
|| stream_id == EMM		
|| stream_id == program_stream_directory		
|| stream_id == DSMCC_stream		
|| stream_id == ITU-T Rec. H.222.1 type E stream) {		
for (i = 0; i < PES_packet_length; i++) {		
PES_packet_data_byte	**8**	**bslbf**
}		
}		
else if (stream_id == padding_stream) {		
for (i < 0; i < PES_packet_length; i++) {		
padding_byte	**8**	**bslbf**
}		
}		
}		

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b) Replace Table 2-18 (Stream_id assignments) as follows (with the changes underlined):

Table 2-18 – Stream_id assignments

stream_id	Note	stream coding
1011 1100	(1)	program_stream_map
1011 1101	(2)	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 audio stream number x xxxx
1110 xxxx		ITU-T Rec. H.262 | ISO/IEC 13818-2 or ISO/IEC 11172-2 or ISO/IEC 14496-2 video stream number xxxx
1111 0000	(3)	ECM_stream
1111 0001	(3)	EMM_stream
1111 0010	(5)	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Annex A or ISO/IEC 13818-6_DSM-CC_stream
1111 0011	(2)	ISO/IEC_13522_stream
1111 0100	(6)	ITU-T Rec. H.222.1 type A
1111 0101	(6)	ITU-T Rec. H.222.1 type B
1111 0110	(6)	ITU-T Rec. H.222.1 type C
1111 0111	(6)	ITU-T Rec. H.222.1 type D
1111 1000	(6)	ITU-T Rec. H.222.1 type E
1111 1001	(7)	ancillary_stream
1111 1010		ISO/IEC 14496-1_SL-packetized stream
1111 1011		ISO/IEC 14496-1_FlexMux_stream
1111 1100		metadata stream
1111 1101	(8)	extended_stream_id
1111 1110		reserved data stream
1111 1111	(4)	program_stream_directory

The notation x means that the value '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_directory 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 ITU-T Rec. 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 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, which is a compatible extension of ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Annex A.

NOTE 6 – This stream_id is associated with stream_type 0x09 in Table 2-29.

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 2.4.3.7).

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.

c) Insert the following text and table after the existing semantics for PES_extension_field_length:

stream_id_extension_flag – A 1-bit flag, which when set to '0' indicates that a stream_id_extension field is present in the PES packet header. The value of '1' for this flag is reserved.

stream_id_extension – In Program Streams, the stream_id_extension specifies the type and number of the elementary stream as defined by the stream_id_extension in Table Amd.2-1. In Transport Streams, the stream_id_extension may be set to any valid value which correctly describes the elementary stream type as defined in Table Amd.2-1. In Transport Streams, the elementary stream type is specified in the Program Specific Information as specified in 2.4.4. Note that this field is used as an extension of the stream_id defined above. This field shall not be used unless the value of stream_id is 1111 1101.

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Table Amd.2-1 – Stream_id_extension assignments

stream_id_extension	Note	stream coding
000 0000	1	IPMP Control Information stream
000 0001	2	IPMP stream
000 0010 … 011 1111		reserved_data_stream
100 0000 … 111 1111		private_stream
NOTE 1 – PES packets of stream_id_extension 0b000 0000 (IPMP Control Information Stream) have a unique syntax specified in ISO/IEC 13818-11 (MPEG-2 IPMP). NOTE 2 – PES packets of stream_id_extension 0b000 0001 (IPMP Stream) have a unique syntax specified in ISO/IEC 13818-11 (MPEG-2 IPMP).		

5) Subclause 2.4.4

Replace Table 2-23 (Program specific info) as follows (with the changes underlined):

Table 2-23 – Program specific information

Structure Name	Stream Type	Reserved PID #	Description
Program Association Table	ITU-T Rec. H.222.0 | ISO/IEC 13818-1	0x00	Associates Program Number and Program Map Table PID
Program Map Table	ITU-T Rec. H.222.0 | ISO/IEC 13818-1	Assigned in the PAT	Specifies PID values for components of one or more programs
Network Information Table	Private	Assigned in the PAT	Physical network parameters such as FDM frequencies, Transponder Numbers, etc.
Conditional Access Table	ITU-T Rec. H.222.0 | ISO/IEC 13818-1	0x01	Associates one or more (private) EMM streams each with a unique PID value
Transport Stream Description Table	ITU-T Rec. H.222.0 | ISO/IEC 13818-1	0x02	Associates one or more descriptors from Table 2-39 to an entire Transport Stream
IPMP Control Information Table	ITU-T Rec. H.222.0 | ISO/IEC 13818-1	0x03	Contains IPMP Tool List, Rights Container, Tool Container defined in ISO/IEC 13818-11

6) Subclause 2.4.4.4

Replace Table 2-26 (Table_id) as follows (with the changes underlined):

Table 2-26 – table_id assignment values

Value	description
0x00	program_association_section
0x01	conditional_access_section (CA_section)
0x02	TS_program_map_section
0x03	TS_description_section
0x04	ISO_IEC_14496_scene_description_section
0x05	ISO_IEC_14496_object_descriptor_section
0x06	Metadata_section
0x07	IPMP_Control_Information_section (defined in ISO/IEC13818-11)
0x08-0x3F	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 reserved
0x40-0xFE	User private
0xFF	Forbidden

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7) Subclause 2.4.4.10

Replace Table 2-29 (Stream type assignment) as follows (with the changes underlined):

Add the row with the value of 0x1A for IPMP stream type into the original table and adjust the reserved range of values.

Table 2-29 – Stream type assignments

Value	Description
0x00	ITU-T | ISO/IEC Reserved
0x01	ISO/IEC 11172 Video
0x02	ITU-T Rec. H.262 | ISO/IEC 13818-2 Video or ISO/IEC 11172-2 constrained parameter video stream
0x03	ISO/IEC 11172 Audio
0x04	ISO/IEC 13818-3 Audio
…	…
0x1A	IPMP Stream (defined in ISO/IEC 13818-11, MPEG-2 IPMP)
0x1B-0x7E	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Reserved
0x80-0xFF	User private

8) Subclause 2.6

Replace Table 2-39 (descriptors) as follows (with the changes underlined):

Add the row with the value of 41 for IPMP Descriptor tag into the original table and adjust the reserved range for ITU-T.

Table 2-39 – Program and program element descriptors

descriptor_tag	TS	PS	Identification
0	n/a	n/a	Reserved
1	n/a	n/a	Reserved
2	X	X	video_stream_descriptor
3	X	X	audio_stream_descriptor
4	X	X	hierarchy_descriptor
..	..	..	…
41	X	X	IPMP Descriptor (defined in ISO/IEC 13818-11, MPEG-2 IPMP)
42-63	n/a	n/a	ITU-T Rec. H.222.0 | ISO/IEC 13818-1 Reserved
64-255	n/a	n/a	User private

9) Subclause 2.6.17

Insert the following paragraph after the existing semantics for **CA_PID***:*

In Transport Streams, the presence of PID 0x03 indicates that there is IPMP as described in ISO/IEC 13818-11 used by components in the Transport Stream. In Program Streams, the presence of stream_ID_extension value 0x00 indicates that IPMP as described in ISO/IEC 13818-11 is used by components in the Program Stream. Within a given ITU-T Rec. H.222.0 | ISO/IEC 13818-1 stream, components could use both IPMP as described in ISO/IEC 13818-11 as well as CA as defined in ISO/IEC 13818-1:2000. Compatibility between the two schemes is described in ISO/IEC 13818-11.

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