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

**Part 1:
Systems**

**AMENDMENT 1: Ultra-low latency and
4k and higher resolution support for
transport of JPEG 2000 video**

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

Partie 1: Systèmes

*AMENDEMENT 1: Support de résolution 4k et supérieure et latence
ultrafaible pour le transfert de vidéos JPEG 2000*



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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted.

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ITU-T as Rec. ITU-T H.220.0 (03/2017) and drafted in accordance with its editorial rules. It was adopted under the JTC1 PSDO procedure by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T.

A list of all parts in the ISO/IEC 13818 series can be found on the ISO website.

**INTERNATIONAL STANDARD ISO/IEC 13818-1
RECOMMENDATION ITU-T H.222.0**

**Information technology – Generic coding of moving pictures and
associated audio information – Part 1: Systems**

Amendment 1

**Ultra-low latency and 4K and higher resolution support for
transport of JPEG 2000 video**

Summary

Amendment 1 to ITU-T H.222.0 (2017) | ISO/IEC 13818-1:2017 fixes interoperability issues in the transport of JPEG 2000 Part 1 (Rec. ITU-T T.800 | ISO/IEC 15444-1) by removing references to Rec. ITU-T T.800 | ISO/IEC 15444-1 Annex M and updating the definition of the elementary stream header to make it self-contained in ISO/IEC 13818-1 Annex S. It further adds support for JPEG 2000 Ultra-Low Latency (ULL) encoding and transport of professional video, audio and data over Internet Protocol networks, by specifying the use of horizontal, independent JPEG 2000 stripes. Finally, it supports higher resolutions (4K or higher) of JPEG 2000 video images by adding a new block mode. This new mode allows implementers to divide a given frame into blocks.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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1.1	ITU-T H.222.0 (1995) Amd. 1	1996-11-11	16	11.1002/1000/3834
1.2	ITU-T H.222.0 (1995) Amd. 2	1996-11-11	16	11.1002/1000/4096
1.3	ITU-T H.222.0 (1995) Technical Cor. 1	1998-02-06	16	11.1002/1000/4532
1.4	ITU-T H.222.0 (1995) Amd. 3	1998-02-06	16	11.1002/1000/4228
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2.2	ITU-T H.222.0 (2000) Technical Cor. 2	2002-03-29	16	11.1002/1000/5675
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2.8	ITU-T H.222.0 (2000) Amd. 4	2005-01-08	16	11.1002/1000/7436
2.9	ITU-T H.222.0 (2000) Amd. 5	2005-01-08	16	11.1002/1000/7437
2.10	ITU-T H.222.0 (2000) Technical Cor. 4	2005-09-13	16	11.1002/1000/8560
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3.1	ITU-T H.222.0 (2006) Amd. 1	2007-01-13	16	11.1002/1000/9024
3.2	ITU-T H.222.0 (2006) Amd. 2	2007-08-29	16	11.1002/1000/9214

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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3.3	ITU-T H.222.0 (2006) Cor. 1	2008-06-13	16	11.1002/1000/9471
3.4	ITU-T H.222.0 (2006) Cor. 2	2009-03-16	16	11.1002/1000/9692
3.5	ITU-T H.222.0 (2006) Amd. 3	2009-03-16	16	11.1002/1000/9691
3.6	ITU-T H.222.0 (2006) Cor. 3	2009-12-14	16	11.1002/1000/10621
3.7	ITU-T H.222.0 (2006) Cor. 4	2009-12-14	16	11.1002/1000/10622
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4.5	ITU-T H.222.0 (2012) Amd. 5	2014-10-14	16	11.1002/1000/12306
5.0	ITU-T H.222.0	2014-10-14	16	11.1002/1000/12359
5.1	ITU-T H.222.0 (2014) Amd. 1	2015-04-29	16	11.1002/1000/12452
5.2	ITU-T H.222.0 (2014) Amd. 1 Cor. 1	2015-11-29	16	11.1002/1000/12625
5.3	ITU-T H.222.0 (2014) Amd. 2	2015-12-14	16	11.1002/1000/12632
5.4	ITU-T H.222.0 (2014) Amd. 3	2015-12-14	16	11.1002/1000/12633
5.5	ITU-T H.222.0 (2014) Amd. 1 Cor. 2	2016-07-14	16	11.1002/1000/12899
5.5	ITU-T H.222.0 (2014) Cor. 1	2016-07-14	16	11.1002/1000/12903
5.7	ITU-T H.222.0 (2014) Amd. 4	2016-07-14	16	11.1002/1000/12900
5.8	ITU-T H.222.0 (2014) Amd. 5	2016-07-14	16	11.1002/1000/12901
5.9	ITU-T H.222.0 (2014) Amd. 6	2016-07-14	16	11.1002/1000/12902
5.10	ITU-T H.222.0 (2014) Amd. 3 Cor. 1	2017-03-01	16	11.1002/1000/13184
5.10	ITU-T H.222.0 (2014) Cor. 2	2017-03-01	16	11.1002/1000/13188
5.12	ITU-T H.222.0 (2014) Amd. 7	2017-03-01	16	11.1002/1000/13186
5.13	ITU-T H.222.0 (2014) Amd. 8	2017-03-01	16	11.1002/1000/13187
6.0	ITU-T H.222.0	2017-03-01	16	11.1002/1000/13269
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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATIONInformation technology – Generic coding of moving pictures and
associated audio information – Part 1: Systems

Amendment 1

Ultra-low latency and 4K and higher resolution support for
transport of JPEG 2000 video

1) Clause 2.1.69

Replace 2.1.69 with the following:

2.1.69 JPEG 2000 (J2K) video access unit: The JPEG 2000 codestream or codestreams comprising a decodable and randomly accessible (portion of) image, preceded by all the parameters required to decode the access unit and display the decoded data.

2) New clauses 2.1.70, 2.1.71, 2.1.73, 2.1.74

Add new 2.1.70, 2.1.71, 2.1.73, 2.1.74 and update other subclause numbering accordingly:

2.1.70 J2K block: The JPEG 2000 codestream or codestreams corresponding to a rectangular portion of a video frame, as detailed in S.3.

NOTE – Usage of J2K blocks requires J2K block mode (defined in 2.1.71) to be enabled in the J2K video descriptor. Such usage facilitates the support of 4k and higher resolutions.

2.1.71 J2K block mode: Optional mode defined in S.3, dividing each frame of a J2K video stream in a certain amount of rectangular blocks, each encoded as an independent J2K block (defined in 2.1.70).

2.1.73 J2K stripe: The JPEG 2000 codestream or codestreams comprising a decodable horizontally divided portion of an image, as detailed in S.4.

NOTE – Usage of J2K stripes requires J2K stripe mode (defined in 2.1.74) to be enabled in the J2K video descriptor. Such usage enables transport of a J2K video stream with a low end-to-end latency.

2.1.74 J2K stripe mode: Optional mode defined in S.4, dividing the (portion of) image transported in a J2K video access unit in a succession of horizontal stripes, each encoded as an independent J2K stripe (defined in 2.1.73).

3) Clause 2.6.80

Replace Table 2-99 with the following:

Table 2-99 – J2K video descriptor

Syntax	No. of bits	Mnemonic
J2K_video_descriptor() {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
extended_capability_flag	1	bslbf
profile_and_level	15	bslbf
horizontal_size	32	uimsbf
vertical_size	32	uimsbf
max_bit_rate	32	uimsbf
max_buffer_size	32	uimsbf
DEN_frame_rate	16	bslbf
NUM_frame_rate	16	bslbf
if(extended_capability_flag == '1') {		

Table 2-99 – J2K video descriptor

Syntax	No. of bits	Mnemonic
stripe_flag	1	bslbf
block_flag	1	bslbf
mdm_flag	1	bslbf
reserved (all bits to be set to '0')	5	bslbf
} else {		
color_specification	8	bslbf
}		
still_mode	1	bslbf
interlaced_video	1	bslbf
reserved	6	bslbf
if (extended_capability_flag == '1') {		
colour_primaries	8	uimsbf
transfer_characteristics	8	uimsbf
matrix_coefficients	8	uimsbf
video_full_range_flag	1	bslbf
reserved	7	bslbf
if (stripe_flag == '1') {		
strp_max_idx	8	uimsbf
strp_height	16	uimsbf
}		
if (block_flag == '1') {		
full_horizontal_size	32	uimsbf
full_vertical_size	32	uimsbf
blk_width	16	uimsbf
blk_height	16	uimsbf
max_blk_idx_h	8	uimsbf
max_blk_idx_v	8	uimsbf
blk_idx_h	8	uimsbf
blk_idx_v	8	uimsbf
}		
if (mdm_flag == '1') {		
X_c0, Y_c0, X_c1, Y_c1, X_c2, Y_c2	16x6	uimsbf
X_wp	16	uimsbf
Y_wp	16	uimsbf
L_max	32	uimsbf
L_min	32	uimsbf
MaxCLL	16	uimsbf
MaxFALL	16	uimsbf
}		
}		
for (i=0; i<N; i++) {		
private_data_byte	8	bslbf
}		
}		

4) Clause 2.6.81

Replace 2.6.81 with the following:

2.6.81 Semantics of fields in J2K video descriptor

extended_capability_flag – This 1-bit field indicates that the J2K video stream uses extended color specification (through three bytes defining the chromaticity parameters, as described below), and that it might have one or several of the following capabilities enabled: stripes (through the J2K stripe mode), blocks (through the J2K block mode), or inclusion of mastering display metadata. The exact list of enabled capabilities is set through subsequent flags in the video descriptor (see below).