FINAL
DRAFT

AMENDMENT

ISO/IEC 15444-1 FDAM 2

ISO/IEC JTC **1**

Secretariat: **ANSI**

Voting begins on:
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Voting terminates on:
2009-05-13

Information technology — JPEG 2000 image coding system: Core coding system

AMENDMENT 2: Extended profiles for cinema and video production and archival applications

Technologies de l'information — Système de codage d'images JPEG 2000: Système de codage de noyau

AMENDEMENT 2: Profils étendus pour production au cinéma et vidéo, et applications d'archivage

Please see the administrative notes on page ii-1

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

Information technology – JPEG 2000 image coding: Core coding system

AMENDMENT 2: Extended profiles for cinema and video production and archival applications

1) Annex A

Add the following at the end of Annex A (i.e., immediately following Table A-46):

The profiles listed under profile indication numbers Rsiz= 5 to 7 are intended for archiving and production purposes. The two extended scalable profiles are intended to be used for easily accessible archives. The long-term storage profile is intended for original camera capture or post-production workflows.

Table A-46 contd. — Codestream restrictions for cinema and video production and archival applications

	Scalable 2k digital cinema profile	**Scalable 4k digital cinema profile**	**Long-term storage profile**
SIZ marker segment			
Profile Indication	Rsiz=5	Rsiz=6	Rsiz=7
Image size	Xsiz <= 2048, Ysiz <= 1080	Xsiz <= 4096, Ysiz <= 2160	Xsiz <= 16384, Ysiz <= 8640
Tiles	one tile for the whole image: YTsiz + YTOsiz >= Ysiz XTsiz + XTOsiz >= Xsiz	one tile for the whole image: YTsiz + YTOsiz >= Ysiz XTsiz + XTOsiz >= Xsiz	One tile for the whole image or minimum tile size: YTsiz + YTOsiz >= 512 XTsiz + XTOsiz >= 1024
Image and tile origin	XOsiz = YOsiz = XTOsiz = YTOsiz = 0	XOsiz = YOsiz = XTOsiz = YTOsiz = 0	XOsiz = YOsiz = XTOsiz = YTOsiz = 0
Sub-sampling	$XRsiz^i = YRsiz^i = 1$	$XRsiz^i = YRsiz^i = 1$	No restriction
Number of components	Csiz = 3	Csiz = 3	Csiz<=8
Bitdepth	$Ssiz^i = 11$ (i.e., 12 bit unsigned)	$Ssiz^i = 11$ (i.e., 12 bit unsigned)	No restriction
RGN marker segment	Disallowed, i.e., no region of interest	Disallowed, i.e., no region of interest	Disallowed, i.e., no region of interest
COD/COC marker segments	Main header only	Main header only	Main header only
Coding style	Scod, Scoc = 0000 0esp, where e=s=0, and p=1 Note – e=0: EPH marker shall not be used s=0: SOP marker shall not be used p=1: precincts defined in $SPcodI^i$ / $SPcocI^i$	Scod, Scoc = 0000 0esp, where e=s=0, and p=1 Note – e=0: EPH marker shall not be used s=0: SOP marker shall not be used p=1: precincts defined in $SPcodI^i$ / $SPcocI^i$	Scod, Scoc = 0000 0esp, where e=s=1, and p=0 or 1 Note – e: EPH marker shall be used s: SOP marker may be used p: precincts with PPx=15 and PPy=15 or defined in $SPcodI^i$ / $SPcocI^i$
Progression order	CPRL	CPRL	CPRL
Number of layers	L=2	L=2	L<=5
Multiple component transform	All component transforms defined in ISO/IEC 15444-	All component transforms defined in ISO/IEC 15444-	All component transforms defined in ISO/IEC 15444-

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	1 may be used.	1 may be used.	1 may be used.
Number of decomposition levels	N_L <= 5 Every component of every image of a codestream shall have the same number of wavelet transform levels. The number of deployed decomposition levels shall be set accordingly in all COD and COC markers.	1<= N_L <= 6 Every component of every image of a codestream shall have the same number of wavelet transform levels. The number of deployed decomposition levels shall be set accordingly in all COD and COC markers.	No restriction, with respect to: (Xsiz-XOsiz)/D(*I*) <= 64 (Ysiz-YOsiz)/D(*I*) <= 64 and D(*I*)=pow(2,N_L) for each component *I* Every component of every image of a codestream shall have the same number of wavelet transform levels. The number of deployed decomposition levels shall be set accordingly in all COD and COC markers.
Code-block size	xcb = ycb = 5 The corresponding values shall be set accordingly in all deployed COD and COC markers.	xcb = ycb = 5 The corresponding values shall be set accordingly in all deployed COD and COC markers.	xcb <= 6, ycb <= 6 The corresponding values shall be set accordingly in all deployed COD and COC markers.
Code-block style	SPcod, SPcoc = 0000 0000	SPcod, SPcoc = 0000 0000	SPcod, SPcoc = 00sp vtra where r = v = 0, and a, t, p, s = 0 or 1 NOTE — a = 1 for selective arithmetic coding bypass t = 1 for termination on each coding pass, p = 1 for predictive termination s = 1 for segmentation symbols
Transformation	9-7 irreversible filter The corresponding filter shall be set accordingly in all COD and COC markers.	9-7 irreversible filter The corresponding filter shall be set accordingly in all COD and COC markers.	9-7 irreversible filter 5-3 reversible filter The corresponding filter shall be set accordingly in all COD and COC markers.
Precinct size	PPx = PPy = 7 for N_LLL band, else 8 The corresponding values shall be set accordingly in all COD and COC markers.	PPx = PPy = 7 for N_LLL band, else 8 The corresponding values shall be set accordingly in all COD and COC markers.	PPx >= xcb, PPy >= ycb The corresponding values shall be set accordingly in all COD and COC markers.
Tile-parts	Each compressed image shall have exactly 6 tile parts. Each of the first 3 tile parts shall contain all data necessary to decompress one 2K color component compatible to 2k digital cinema profile. Each of the next tile parts shall contain all additional data necessary to decompress the rest color component. The resulting codestream structure is diagramed in Figures A-29	Each compressed image shall have exactly 12 tile parts. Each of the first 3 tile parts shall contain all data necessary to decompress one 2K color component compatible to 2k digital cinema profile. Each of the next 3 tile parts shall contain all additional data necessary to decompress one 4K color component. Each of the next 3 tile parts shall contain all additional data necessary for the rest of one 2k color component. Each of the next tile parts shall contain all additional data necessary to decompress one the rest of	Each compressed image **tile** shall consist of exactly Csiz tile parts. Each tile part shall contain all data from one component of the considered tile.

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		the color component. The resulting codestream structure is diagramed in Figures A-25, A-27 and A-28.	
Other markers			
Packed headers (PPM, PPT)	Disallowed	Disallowed	Disallowed
Tile-part lengths (TLM)	TLM marker segments are required in each image	TLM marker segments are required in each image	TLM marker segments are required in each image
Packet length, tile-part header (PLT)	For each tile-part a complete list of packet lengths shall be provided	For each tile-part a complete list of packet lengths shall be provided	For each tile-part a complete list of packet lengths shall be provided
QCD, QCC	Main header only	Main header only	Main header only
SOP, EPH	Disallowed	Disallowed	Each packet in any given tile-part shall be prepended with a SOP marker segment and each packet header in any given tile-part shall be postpended with an EPH marker segment
POC marker	There shall be exactly one POC marker segment in the main header. Other POC marker segments are disallowed. The POC marker segment shall specify exactly two progressions having the following parameters: a. First progression: RSpoc = 0, CSpoc = 0, LYEpoc = 1, REpoc = N_L+1, CEpoc = 3, Ppoc = 4 b. Second progression: RSpoc = 0, CSpoc = 0, LYEpoc = 2, REpoc = N_L+1, CEpoc = 3, Ppoc = 4	There shall be exactly one POC marker segment in the main header. Other POC marker segments are disallowed. The POC marker segment shall specify exactly four progressions having the following parameters: a. First progression: RSpoc = 0, CSpoc = 0, LYEpoc = 1, REpoc = N_L, CEpoc = 3, Ppoc = 4 b. Second progression: RSpoc = N_L, CSpoc = 0, LYEpoc = 1, REpoc = N_L+1, CEpoc = 3, Ppoc = 4 c. Third Progression: RSpoc = 0, CSpoc = 0, LYEpoc = 2, REpoc = N_L, CEpoc = 3, Ppoc = 4 d. Fourth Progression: RSpoc = N_L, CSpoc = 0, LYEpoc = 2, REpoc = N_L+1, CEpoc = 3, Ppoc = 4	Disallowed

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Application specific restrictions			
Error protection	Disallowed	Disallowed	The use of marker segments defined in ITU-T Rec. T.810 | ISO/IEC 15444-11 for the detection, correction and protection against errors that may result from aging media is not mandatory but optional and recommended.
Max compressed bytes for any image frame (aggregate of all 3 color components)	1302083 bytes	2604166 bytes	No restrictions
Max compressed bytes for any single color component of an image frame including all relevant tile-part headers.	1041666 bytes	2083332 bytes	No restrictions
Max compressed bytes for quality layer 0 of any image frame (aggregate of all 3 color components) shall include relevant headers and markers assuring Digital Cinema packages can be obtained by simply stripping some tile parts.	1302083 bytes for 24 fps 651041 bytes for 48 fps	1302083 bytes for 24 fps	No restrictions
Max compressed bytes for layer 0 of any single color component of an image frame including all relevant tile-part headers.	1041666 bytes for 24 fps 520833 bytes for 48 fps	1041666 bytes for 24 fps for 2K portion of each component.	No restrictions



Figure A-29 — Proposed codestream structure. Assuming N_L wavelet transform levels (N_L+1 resolutions), the rectangle labeled c*i*p*r*l1 (*i* = 0, 1, 2) contains all packets for color component *i*, all precincts, resolutions 0 through N_L and layer 1. The rectangle labeled c*i*p*r*l2 (*i* = 0, 1, 2) contains all packets for color component *i*, resolutions 0 through N_L and layer 2.

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