

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

T.800

Amendment 1

(09/2005)

SERIES T: TERMINALS FOR TELEMATIC SERVICES

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

**Amendment 1: Profiles for digital cinema
applications**

ITU-T Recommendation T.800 (2002) – Amendment 1



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

Amendment 1

Profiles for digital cinema applications

Summary

The purpose of this Recommendation | International Standard is to provide two additional profiles to ISO/IEC 15444-1:2004 for digital cinema applications.

The first new profile describes codestream restrictions for 2K motion pictures, while the second profile describes codestream restrictions for 4K motion pictures. 2K motion pictures are characterized by a maximum frame size of 2048×1080 , while 4K motion pictures are characterized by a maximum frame size of 4096×2160 . The two profiles are necessary to limit the scope of decoder implementations for motion picture distribution and exhibition.

Source

Amendment 1 to ITU-T Recommendation T.800 (2002) was approved on 13 September 2005 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure. An identical text is also published as ISO/IEC 15444-1, Amendment 1.

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.

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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, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

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

Amendment 1

Profiles for digital cinema applications

Annex A

a) Delete the following sentence from the first paragraph of subclause A.10:

"Codestream Restrictions" have two profiles, Profile-0 and Profile-1.

b) Add the following at the end of Annex A (i.e., immediately following Table A.45):

A.10.1 Codestream restrictions for digital cinema

In addition to Profile-0 and Profile-1, two profiles are defined for digital cinema applications. These profiles are Profile-3 and Profile-4, and are detailed in Table A.46.

Table A.46 – Codestream restrictions for digital cinema applications

	2K digital cinema profile	4K digital cinema profile
SIZ marker segment		
Profile Indication	$R_{siz} = 3$	$R_{siz} = 4$
Image size	$X_{siz} \leq 2048, Y_{siz} \leq 1080$	$X_{siz} \leq 4096, Y_{siz} \leq 2160$
Tiles	One tile for the whole image: $Y_{Tsiz} + Y_{TOsiz} \geq Y_{siz}$ $X_{Tsiz} + X_{TOsiz} \geq X_{siz}$	Same
Image and tile origin	$X_{Osiz} = Y_{Osiz} = X_{TOsiz} = Y_{TOsiz} = 0$	Same
Sub-sampling	$X_{Rsiz}^i = Y_{Rsiz}^i = 1$	Same
Number of components	$C_{siz} = 3$	Same
Bit depth	$S_{siz}^i = 11$ (i.e., 12-bit unsigned)	Same
RGN marker segment	Disallowed, i.e., no region of interest	Same
Marker locations		
Packed headers (PPM, PPT)	Disallowed	Same
COD, COC, QCD, QCC	Main header only	Same
COD/COC marker segments		
Number of decomposition levels	$N_L \leq 5$ Every component of every image of a distribution shall have the same number of wavelet transform levels.	$1 \leq N_L \leq 6$ Every component of every image of a distribution shall have the same number of wavelet transform levels.
Number of layers	Shall be exactly 1	Same
Code-block size	$x_{cb} = y_{cb} = 5$	Same
Code-block style	$SP_{cod}, SP_{coc} = 0000\ 0000$	Same
Precinct size	$PP_x = PP_y = 7$ for $N_L LL$ band, else 8	Same

Table A.46 – Codestream restrictions for digital cinema applications

	2K digital cinema profile	4K digital cinema profile
Progression order	CPRL, POC marker disallowed	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 , CEpoc = 3, Ppoc = 4 b) Second progression: RSpoc = N_L , CSpoc = 0, LYEpoc = 1, REpoc = $N_L + 1$, CEpoc = 3, Ppoc = 4
Tile-parts	Each compressed image shall have exactly 3 tile parts. Each tile part shall contain all data from one color component	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. Each of the next 3 tile parts shall contain all additional data necessary to decompress one 4K color component. The resulting codestream structure is diagramed in Figure A.25.
Tile-part lengths	TLM marker segments are required in each image	Same
Application specific restrictions		
Max compressed bytes for any image frame (aggregate of all 3 color components)	1302083 bytes for 24 fps 651041 bytes for 48 fps	1302083 bytes (for 24 fps)
Max compressed bytes for any single color component of an image frame	1041666 bytes for 24 fps 520833 bytes for 48 fps	1041666 bytes for 2K portion of each component (for 24 fps)

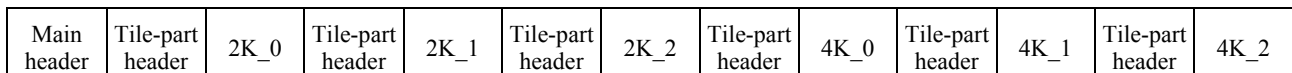


Figure A.25 – 4K tile parts

Assuming N_L wavelet transform levels ($N_L + 1$ resolutions), the rectangle labelled 2K_i ($i = 0, 1, 2$) contains all packets for color component i , resolutions 0 through $N_L - 1$. The rectangle labelled 4K_i ($i = 0, 1, 2$) contains all packets for color component i , resolution N_L .

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