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

AMENDMENT 3:
New level for 1080@50p/60p

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

AMENDEMENT 3: Nouveau niveau pour 1080@50p/60p

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Foreword

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The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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INTERNATIONAL STANDARD
RECOMMENDATION ITU-T

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

Amendment 3

New level for 1080@50p/60p

1)   Clause 8, Table 8-3

In clause 8, replace Table 8-3 with:

Table 8-3 – Level identification

Level identification	Level
1011 to 1111	(Reserved)
1010	Low
1001	(Reserved)
1000	Main
0111	(Reserved)
0110	High 1440
0101	(Reserved)
0100	High
0011	(Reserved)
0010	HighP
0000 and 0001	(Reserved)

2)   Clause 8.3 and Table 8-8

Replace clause 8.3 and Table 8-8 with:

8.3   Relationship between defined levels

The Low, Main, High-1440, High and HighP levels have a hierarchical relationship. Therefore the parameter constraints of a 'higher' level equal or exceed the constraints of 'lower' levels (e.g., for a given profile, a Main level decoder shall be able to decode a bitstream conforming to Low level restrictions). The order of hierarchy is given in Table 8-3.

The different parameter constraints for levels are given in Table 8-8.

Table 8-8 – Parameter constraints for levels

Syntactic Element	Level				
	Low	Main	High-1440	High	HighP
f_code[0][0] (forward horizontal)	[1:7]	[1:8]	[1:9]	[1:9]	[1:9]
f_code[1][0][a] (backward horizontal)	[1:7]	[1:8]	[1:9]	[1:9]	[1:9]
frame_rate_code	[1:5]	[1:5]	[1:8]	[1:8]	[1:8]
picture_structure	'01', '10', '11'	'01', '10', '11'	'01', '10', '11'	'01', '10', '11'	'11'
frame_pred_frame_dct	[0:1]	[0:1]	[0:1]	[0:1]	1
Sample Density	Table 8-11				
Luminance Sample Rate	Table 8-12				
Maximum Bit Rate	Table 8-13				
Buffer Size	Table 8-14				
Frame picture					
f_code[0][1] (forward vertical)	[1:4]	[1:5]	[1:5]	[1:5]	[1:5]
f_code[1][1][a] (backward vertical)	[1:4]	[1:5]	[1:5]	[1:5]	[1:5]
Vertical vector range[b]	[–64:63,5]	[–128:127,5]	[–128:127,5]	[–128:127,5]	[–128:127,5]
Field picture					
f_code[0][1] (forward vertical)	[1:3]	[1:4]	[1:4]	[1:4]	NA[c]
f_code[1][1][a] (backward vertical)	[1:3]	[1:4]	[1:4]	[1:4]	NA[c]
Vertical vector range[b]	[–32:31,5]	[–64:63,5]	[–64:63,5]	[–64:63,5]	NA[c]

[a] For Simple profile bitstreams which do not include B-pictures, f_code[1][0] and f_code[1][1] shall be set to 15 (not used).

[b] This restriction applies to the final reconstructed motion vector. In the case of dual prime motion vectors, this restriction applies to all the following values:

vector'[0][0][1]
((vector'[0][0][1] * m[parity_ref][parity_pred])//2)
((vector'[0][0][1] * m[parity_ref][parity_pred])//2) + e[parity_ref][parity_pred]
((vector'[0][0][1] * m[parity_ref][parity_pred])//2) + dmvector[1]
((vector'[0][0][1] * m[parity_ref][parity_pred])//2) + e[parity_ref][parity_pred] + dmvector[1]

[c] In this table, 'NA' indicates a constraint that does not apply due to a constraint on the value of picture_structure.

3) Clause 8.5, Table 8-11

In clause 8.5, replace Table 8-11 with:

Table 8-11 – Upper bounds for sampling density

Level	Spatial resolution layer		Profile						
			Simple	Main	SNR	Spatial	High	4:2:2	Multi
HighP	Enhancement	Samples/line Lines/frame Frames/sec		1920 1088 60					
	Lower	Samples/line Lines/frame Frames/sec		–					
High	Enhancement	Samples/line Lines/frame Frames/sec		1920 1088 60			1920 1088 60	1920 1088 60	1920 1088 60
	Lower	Samples/line Lines/frame Frames/sec		–			960 576 30	–	1920 1088 60
High-1440	Enhancement	Samples/line Lines/frame Frames/sec		1440 1088 60		1440 1088 60	1440 1088 60	–	1440 1088 60
	Lower	Samples/line Lines/frame Frames/sec		–		720 576 30	720 576 30	–	1440 1088 60
Main	Enhancement	Samples/line Lines/frame Frames/sec	720 576 30	720 576 30	720 576 30		720 576 30	720 608 a) 30	720 576 30
	Lower	Samples/line Lines/frame Frames/sec	–	–	–		352 288 30	–	720 576 30
Low	Enhancement	Samples/line Lines/frame Frames/sec		352 288 30	352 288 30				352 288 30
	Lower	Samples/line Lines/frame Frames/sec		–	–			–	352 288 30

In the case of single layer or SNR scaled coding, the limits specified by 'Enhancement layer' apply.

a) 512 lines/frame for 525/60, 608 lines/frame for 625/50.

4) Clause 8.5, Table 8-12

In clause 8.5, replace Table 8-12 with:

Table 8-12 – Upper bounds for luminance sample rate (samples/s)

Level	Spatial resolution layer	Profile						
		Simple	Main	SNR	Spatial	High	4:2:2	Multi-view
HighP	Enhancement		125 337 600					
	Lower		–					
High	Enhancement		62 668 800			62 668 800 (4:2:2) 83 558 400 (4:2:0)	62 668 800	62 668 800
	Lower		–			14 745 600 (4:2:2) 19 660 800 (4:2:0)	–	62 668 800
High-1440	Enhancement		47 001 600		47 001 600	47 001 600 (4:2:2) 62 668 800 (4:2:0)	–	47 001 600
	Lower		–		10 368 000	11 059 200 (4:2:2) 14 745 600 (4:2:0)	–	47 001 600
Main	Enhancement	10 368 000	10 368 000	10 368 000		11 059 200 (4:2:2) 14 745 600 (4:2:0)	11 059 200	10 368 000
	Lower	–	–	–		– 3 041 280 (4:2:0)	–	10 368 000
Low	Enhancement		3 041 280	3 041 280			–	3 041 280
	Lower		–	–			–	3 041 280
NOTE – In the case of single layer or SNR scaled coding, the limits specified by 'Enhancement layer' apply.								

5) Clause 8.6, Table 8-13

In clause 8.6, replace Table 8-13 with:

Table 8-13 – Upper bounds for bit rates (Mbit/s)

Level	Profile						
	Simple	Main	SNR	Spatial	High	4:2:2	Multi-view
HighP		80					
High		80			100 all layers 80 middle + base layer 25 base layer	300	– 130 both layers 80 base layer
High-1440		60		60 all layers 40 middle + base layers 15 base layer	80 all layers 60 middle + base layers 20 base layer	–	– 100 both layers 60 base layer
Main	15	15	– 15 both layers 10 base layer		20 all layers 15 middle + base layer 4 base layer	50	– 25 both layers 15 base layer
Low		4	– 4 both layers 3 base layer			–	– 8 both layers 4 base layer

NOTE 1 – This table defines the maximum rate of operation of the VBV for a coded bitstream of the given profile and level. This rate is indicated by bit_rate (see 6.3.3).

NOTE 2 – This table defines the maximum permissible data rate for all layers up to and including the stated layer. For multi-layer coding applications, the data rate apportioned between layers is constrained only by the maximum rate permitted for a given layer as stated in this table.

NOTE 3 – 1 Mbit = 1 000 000 bits

6) Clause 8.6, Table 8-14

In clause 8.6, replace Table 8-14 with:

Table 8-14 – VBV buffer size requirements (bits)

Level	Layer	Profile						
		Simple	Main	SNR	Spatial	High	4:2:2	Multi-view
HighP	Enhancement 2 Enhancement 1 Base		9 781 248					
High	Enhancement 2 Enhancement 1 Base		9 781 248			12 222 464 9 781 248 3 047 424	47 185 920	– 15 898 480 9 787 248
High-1440	Enhancement 2 Enhancement 1 Base		7 340 032		7 340 032 4 882 432 1 835 008	9 781 248 7 340 032 2 441 216	–	– 12 222 464 7 340 032
Main	Enhancement 2 Enhancement 1 Base	1 835 008	1 835 008	– 1 835 008 1 212 416		2 441 216 1 835 008 475 136	9 437 184	– 3 047 424 1 835 008
Low	Enhancement 2 Enhancement 1 Base		475 136	– 475 136 360 448			–	– 950 272 475 136

NOTE 1 – The buffer size is calculated to be proportional to the maximum allowable bit rate, *rounded down* to the nearest multiple of 16×1024 bits. The reference value for scaling is the Main profile, Main level buffer size.

NOTE 2 – This table defines the *total* decoder buffer size required to decode all layers up to and including the stated layer. For multi-layer coding applications, the allocation of buffer memory between layers is constrained only by the maximum size permitted for a given layer as stated in this table.

NOTE 3 – The syntactic element corresponding to this table is vbv_buffer_size (see 6.3.3).