FINAL DRAFT

AMENDMENT

ISO/IEC 14496-10:2014 FDAM 2

ISO/IEC JTC **1**/SC **29**

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Information technology — Coding of audio-visual objects —

Part 10: Advanced Video Coding

AMENDMENT 2: Additional Levels and Supplemental Enhancement Information

Technologies de l'information — Codage des objets audiovisuels —

Partie 10: Codage visuel avancé

AMENDEMENT 2: Niveaux additionnels et information d'amélioration supplémentaire

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Amendment 2 to ISO/IEC 14496-10:2014 was prepared by ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

Information technology — Coding of audio-visual objects —

Part 10: Advanced Video Coding

AMENDMENT 2: Additional Levels and Supplemental Enhancement Information

Page 1, Clause 2

Append the following reference:

— ISO/IEC 23001-11, *Information technology — MPEG systems technologies — Part 11: Energy-efficient media consumption (green metadata)*

Page 306, Annex A

Replace A.3 with the following:

A.3 Levels

The following is specified for expressing the constraints in this annex.

— Let access unit n be the n-th access unit in decoding order with the first access unit being access unit 0.

— Let picture n be the primary coded picture or the corresponding decoded picture of access unit n.

Let the variable fR be derived as follows:

— If the level number is equal to 6.0, 6.1, or 6.2, fR is set equal to 1 ÷ 300.

— Otherwise, if picture n is a frame, fR is set equal to 1 ÷ 172.

— Otherwise (picture n is a field), fR is set equal to 1 ÷ (172 * 2).

Page 307, Annex A

Replace the text of items k) and l) of A.3.1 with the following:

k) The vertical motion vector component range for luma motion vectors does not exceed the range from –MaxVmvR to (MaxVmvR – 0.25) in units of luma frame samples, where MaxVmvR is specified in Table A-1.

NOTE 1 When chroma_format_idc is equal to 1 and the current macroblock is a field macroblock, the motion vector component range for chroma motion vectors may exceed the range from –MaxVmvR to (MaxVmvR – 0.25) in units of luma frame samples, due to the method of deriving chroma motion vectors as specified in 8.4.1.4.

l) The horizontal motion vector component range for luma motion vectors does not exceed the following range:

— If the level number is less than 6.0, the specified range is from −2 048 to 2 047.75, inclusive, in units of luma samples.

— Otherwise, the specified range is from −8 192 to 8 191.75, inclusive, in units of luma samples.

Page 309, Annex A

Replace Table A-1 with the following:

Table A-1 — Level limits

Level number	Max macroblock processing rate MaxMBPS (MB/s)	Max frame size MaxFS (MBs)	Max decoded picture buffer size MaxDpbMbs (MBs)	Max video bit rate MaxBR (1 000 bits/s, 1 200 bits/s, cpbBrVclFactor bits/s, or cpbBrNalFactor bits/s)	Max CPB size MaxCPB (1 000 bits, 1 200 bits, cpbBrVclFactor bits, or cpbBrNalFactor bits)	Vertical MV component range MaxVmvR (luma frame samples)	Min compression ratio MinCR	Max number of motion vectors per two consecutive MBs MaxMvsPer2Mb
1	1 485	99	396	64	175	64	2	—
1b	1 485	99	396	128	350	64	2	—
1.1	3 000	396	900	192	500	128	2	—
1.2	6 000	396	2 376	384	1 000	128	2	—
1.3	11 880	396	2 376	768	2 000	128	2	—
2	11 880	396	2 376	2 000	2 000	128	2	—
2.1	19 800	792	4 752	4 000	4 000	256	2	—
2.2	20 250	1 620	8 100	4 000	4 000	256	2	—
3	40 500	1 620	8 100	10 000	10 000	256	2	32
3.1	108 000	3 600	18 000	14 000	14 000	512	4	16
3.2	216 000	5 120	20 480	20 000	20 000	512	4	16
4	245 760	8 192	32 768	20 000	25 000	512	4	16
4.1	245 760	8 192	32 768	50 000	62 500	512	2	16
4.2	522 240	8 704	34 816	50 000	62 500	512	2	16
5	589 824	22 080	110 400	135 000	135 000	512	2	16
5.1	983 040	36 864	184 320	240 000	240 000	512	2	16
5.2	2 073 600	36 864	184 320	240 000	240 000	512	2	16
6	4 177 920	139 264	696 320	240 000	240 000	8 192	2	16
6.1	8 355 840	139 264	696 320	480 000	480 000	8 192	2	16
6.2	16 711 680	139 264	696 320	800 000	800 000	8 192	2	16

Pages 310, 615, 703 and 750, Annexes A, G, H and I

Replace the text of items g) and h) of A.3.2, G.10.2.1, H.10.2.1, and I.10.2.1 with the following:

g) The vertical motion vector component range for luma motion vectors does not exceed the range from −MaxVmvR to (MaxVmvR − 0.25) in units of luma frame samples, where MaxVmvR is specified in Table A-1.

h) The horizontal motion vector component range for luma motion vectors does not exceed the following range:

— If the level number is less than 6.0, the specified range is from –2 048 to 2 047.75, inclusive, in units of luma samples.

— Otherwise, the specified range is from –8 192 to 8 191.75, inclusive, in units of luma samples.

Page 312, Annex A

Replace the text of item k) of A.3.3 with the following:

k) In bitstreams conforming to the High 10, High 4:2:2, High 4:4:4 Predictive, High 10 Intra, High 4:2:2 Intra, High 4:4:4 Intra, or CAVLC 4:4:4 Intra profiles, when the level number is less than 6.0 and PicSizeInMbs is greater than 1 620, the number of macroblocks in any coded slice shall not exceed MaxFS / 4, where MaxFS is specified in Table A-1.

Page 313, Annex A

Replace Table A-3 with the following:

Table A-3 — Baseline and Constrained Baseline profile level limits

Level number	MaxSubMbRectSize
1	576
1b	576
1.1	576
1.2	576
1.3	576
2	576
2.1	576
2.2	576
3	576
3.1	—
3.2	—
4	—
4.1	—
4.2	—
5	—
5.1	—
5.2	—
6.0	—
6.1	—
6.2	—

Page 314, Annex A

Replace Table A-4 with the following:

Table A-4 — Main, High, Progressive High, Constrained High, High 10, High 4:2:2, High 4:4:4 Predictive, High 10 Intra, High 4:2:2 Intra, High 4:4:4 Intra, and CAVLC 4:4:4 Intra profile level limits

Level number	SliceRate	MinLumaBiPredSize	direct_8x8_inference_flag	frame_mbs_only_flag
1	—	—	—	1
1b	—	—	—	1
1.1	—	—	—	1
1.2	—	—	—	1
1.3	—	—	—	1
2	—	—	—	1
2.1	—	—	—	—
2.2	—	—	—	—
3	22	—	1	—
3.1	60	8x8	1	—
3.2	60	8x8	1	—
4	60	8x8	1	—
4.1	24	8x8	1	—
4.2	24	8x8	1	1
5	24	8x8	1	1
5.1	24	8x8	1	1
5.2	24	8x8	1	1
6	24	8x8	1	1
6.1	24	8x8	1	1
6.2	24	8x8	1	1

Page 315, Annex A

Replace Table A-5 with the following:

Table A-5 — Extended profile level limits

Level number	MaxSubMbRect-Size	MinLumaBiPred-Size	frame_mbs_only_flag
1	576	—	1
1b	576	—	1
1.1	576	—	1
1.2	576	—	1
1.3	576	—	1
2	576	—	1
2.1	576	—	—
2.2	576	—	—
3	576	—	—
3.1	—	8 x8	—
3.2	—	8x8	—
4	—	8x8	—
4.1	—	8x8	—
4.2	—	8x8	1
5	—	8x8	1
5.1	—	8x8	1
5.2	—	8x8	1
6	—	8x8	1
6.1	—	8x8	1
6.2	—	8x8	1

Page 316, Annex A

Replace Table A-6 with the following:

Table A-6 — Maximum frame rates (frames per second) for some example frame sizes

Level:					**1**	**1b**	**1.1**	**1.2**	**1.3**	**2**	**2.1**
Max frame size (macroblocks):					**99**	**99**	**396**	**396**	**396**	**396**	**792**
Max macroblocks/ second:					**1 485**	**1 485**	**3 000**	**6 000**	**11 880**	**11 880**	**19 800**
Max frame size (samples):					25 344	25 344	101 376	101 376	101 376	101 376	202 752
Max samples/second:					380 160	380 160	768 000	1 536 000	3 041 280	3 041 280	5 068 800
Format	**Luma Width**	**Luma Height**	**MBs Total**	**Luma Samples**							
SQCIF	**128**	**96**	48	12 288	30.9	30.9	62.5	125.0	172.0	172.0	172.0
QCIF	**176**	**144**	99	25 344	15.0	15.0	30.3	60.6	120.0	120.0	172.0
QVGA	**320**	**240**	300	76 800	—	—	10.0	20.0	39.6	39.6	66.0
525 SIF	**352**	**240**	330	84 480	—	—	9.1	18.2	36.0	36.0	60.0
CIF	**352**	**288**	396	101 376	—	—	7.6	15.2	30.0	30.0	50.0
525 HHR	**352**	**480**	660	168 960	—	—	—	—	—	—	30.0
625 HHR	**352**	**576**	792	202 752	—	—	—	—	—	—	25.0
VGA	**640**	**480**	1 200	307 200	—	—	—	—	—	—	—
525 4SIF	**704**	**480**	1 320	337 920	—	—	—	—	—	—	—
525 SD	**720**	**480**	1 350	345 600	—	—	—	—	—	—	—
4CIF	**704**	**576**	1 584	405 504	—	—	—	—	—	—	—
625 SD	**720**	**576**	1 620	414 720	—	—	—	—	—	—	—
SVGA	**800**	**600**	1 900	486 400	—	—	—	—	—	—	—
XGA	**1 024**	**768**	3 072	786 432	—	—	—	—	—	—	—
720p HD	**1 280**	**720**	3 600	921 600	—	—	—	—	—	—	—

4VGA	**1 280**	**960**	4 800	1 228 800	—	—	—	—	—	—	—
SXGA	**1 280**	**1 024**	5 120	1 310 720	—	—	—	—	—	—	—
525 16SIF	**1 408**	**960**	5 280	1 351 680	—	—	—	—	—	—	—
16CIF	**1 408**	**1 152**	6 336	1 622 016	—	—	—	—	—	—	—
4SVGA	**1 600**	**1 200**	7 500	1 920 000	—	—	—	—	—	—	—
1080 HD	**1 920**	**1 088**	8 160	2 088 960	—	—	—	—	—	—	—
2Kx1K	**2 048**	**1 024**	8 192	2 097 152	—	—	—	—	—	—	—
2Kx1080	**2 048**	**1 088**	8 704	2 228 224	—	—	—	—	—	—	—
4XGA	**2 048**	**1 536**	12 288	3 145 728	—	—	—	—	—	—	—
16VGA	**2 560**	**1 920**	19 200	4 915 200	—	—	—	—	—	—	—
3616x1536 (2.35:1)	**3 616**	**1 536**	21 696	5 554 176	—	—	—	—	—	—	—
3672x1536 (2.39:1)	**3 680**	**1 536**	22 080	5 652 480	—	—	—	—	—	—	—
3840x2160	**3 840**	**2 160**	31 035	7 948 800	—	—	—	—	—	—	—
4Kx2K	**4 096**	**2 048**	32 768	8 388 608	—	—	—	—	—	—	—
4096x2160	**4 096**	**2 160**	34 560	8 847 360	—	—	—	—	—	—	—
4096x2304 (16:9)	**4 096**	**2 304**	36 864	9 437 184	—	—	—	—	—	—	—
7680x4320	**7 680**	**4 320**	129 600	33 177 600	—	—	—	—	—	—	—
8192x4096	**8 192**	**4 096**	131 072	33 554 432	—	—	—	—	—	—	—
8192x4320	**8 192**	**4 320**	138 240	35 389 440	—	—	—	—	—	—	—