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Information technology — Coding of audio-visual objects —

Part 3: **Audio**

AMENDMENT 4: New levels for AAC profiles

Technologies de l'information — Codage des objets audiovisuels — Partie 3: Codage audio

AMENDEMENT 4: Nouveaux niveaux pour profils AAC

Reference number
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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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Amendment 4 to ISO/IEC 14496-3:2009 was prepared by Joint Technical Committee 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 3:
Audio

AMENDMENT 4: New levels for AAC profiles

1 Notes from the editor

Some modifications with respect to ISO/IEC 14496-3:2009 are highlighted by colored background as follows. These highlights shall be removed upon integration of the amendment into a future edition of ISO/IEC 14496-3.

YELLOW Cross-references and subclause numbers that need to be checked and aligned with ISO/IEC 14496-3:2009.

GRAY Changes relative to ISO/IEC 14496-3:2009 that are highlighted for better visibility.

2 Changes to the text of ISO/IEC 14496-3:2009

In 1.2 Normative references, add:

ISO/IEC 23001-8, Information technology — MPEG systems technologies — Part 8: Coding-independent code points

In 1.3 Terms and Definitions, add:

1.3.z **SAOC-DE**: Spatial Audio Object Coding Dialogue Enhancement

and increase the index-number of subsequent entries.

In 1.5.1.1 Audio object type definition, amend Table 1.1 with the updates in the table below:

Object Type ID	Audio Object Type	gain control	[...]	Remark
0	Null			
[..]	[...]			
43	SAOC			
44	LD MPEG Surround			
45	SAOC-DE			
46 - 95	(reserved)			

After 1.5.1.2.39 add the following new subclauses:

1.5.1.2.40 SAOC-DE object type

The SAOC-DE object type conveys Spatial Audio Object Coding Dialogue Enhancement side information (see ISO/IEC 23003-2:2010/Amd.3) in the MPEG-4 Audio framework.

In 1.5.2.1 (Profiles), Table 1.3 (Audio Profiles definition), add:

Object Type ID	Audio Object Type	…
…	…	…
43	SAOC	
44	LD MPEG Surround	
45	SAOC-DE	

In 1.5.2.3 Levels within the profiles replace:

Table 1.10 – Levels for the AAC Profile

Level	Max. channels/ object	Max. sampling rate [kHz]	Max. PCU	Max. RCU
1	2	24	3	5
2	2	48	6	5
3	NA	NA	NA	NA
4	5	48	19	15
5	5	96	38	15

With:

Table 1.10 – Levels for the AAC Profile

Level	Max. channels/ object	Max. sampling rate [kHz]	Max. PCU	Max. RCU
1	2	24	3	5
2	2	48	6	5
3	NA	NA	NA	NA
4	5	48	19	15
5	5	96	38	15
6	7	48	25	19
7	7	96	50	19

Replace:

Table 1.11 – Levels for the High Efficiency AAC Profile

Level	Max. channels/ object	Max. AAC sampling rate, SBR not present [kHz]	Max. AAC sampling rate, SBR present [kHz]	Max. SBR sampling rate [kHz] (in/out)	Max. PCU	Max. RCU	Max. PCU Low power SBR	Max. RCU Low power SBR
1	NA	NA	NA	NA	NA	NA	NA	NA
2	2	48	24	24/48	9	10	7	8

3	2	48	48	48/48 (Note 1)	15	10	12	8
4	5	48	24/48 (Note 2)	48/48 (Note 1)	25	28	20	23
5	5	96	48	48/96	49	28	39	23
Note 1: For level 3 and level 4 decoders, it is mandatory to operate the SBR tool in downsampled mode if the sampling rate of the AAC core is higher than 24kHz. Hence, if the SBR tool operates on a 48kHz AAC signal, the internal sampling rate of the SBR tool will be 96kHz, however, the output signal will be downsampled by the SBR tool to 48kHz. Note 2: For one or two channels the maximum AAC sampling rate, with SBR present, is 48kHz. For more than two channels the maximum AAC sampling rate, with SBR present, is 24kHz.								

With:

Table 1.11 – Levels for the High Efficiency AAC Profile

Level	Max. channels/ object	Max. AAC sampling rate, SBR not present [kHz]	Max. AAC sampling rate, SBR present [kHz]	Max. SBR sampling rate [kHz] (in/out)	Max. PCU	Max. RCU	Max. PCU Low power SBR	Max. RCU Low power SBR
1	NA	NA	NA	NA	NA	NA	NA	NA
2	2	48	24	24/48	9	10	7	8
3	2	48	48	48/48 (Note 1)	15	10	12	8
4	5	48	24/48 (Note 2)	48/48 (Note 1)	25	28	20	23
5	5	96	48	48/96	49	28	39	23
6	7	48	24/48 (Note 2)	48/48 (Note 1)	34	37	27	30
7	7	96	48	48/96	67	37	53	30
Note 1: For level 3, level 4 and level 6 decoders, it is mandatory to operate the SBR tool in downsampled mode if the sampling rate of the AAC core is higher than 24kHz. Hence, if the SBR tool operates on a 48kHz AAC signal, the internal sampling rate of the SBR tool will be 96kHz, however, the output signal will be downsampled by the SBR tool to 48kHz. Note 2: For one or two channels the maximum AAC sampling rate, with SBR present, is 48kHz. For more than two channels the maximum AAC sampling rate, with SBR present, is 24kHz.								

Replace:

Table 1.12 – Levels for the High Efficiency AAC v2 Profile

Level (Note 1)	Max. channels/object	Max. AAC sampling rate, SBR not present [kHz]	Max. AAC sampling rate, SBR present [kHz]	Max. SBR sampling rate [kHz] (in/out)	Max. PCU	Max. RCU	Max. PCU HQ / LP SBR (Note 5)	Max. RCU HQ / LP SBR (Note 5)
1	NA	NA	NA	NA	NA	NA	NA	NA
2	2	48	24	24/48	9	10	9	10
3	2	48	24/48 (Note 3)	48/48 (Note 2)	15	10	15	10
4	5	48	24/48 (Note 4)	48/48 (Note 2)	25	28	20	23
5	5	96	48	48/96	49	28	39	23

Note 1: Level 2,3, and 4 HE AAC v2 Profile decoders implements the baseline version of the parametric stereo tool. A level 5 decoder shall not be limited to the baseline version of the parametric stereo tool.

Note 2: For level 3 and level 4 decoders, it is mandatory to operate the SBR tool in downsampled mode if the sampling rate of the AAC core is higher than 24kHz. Hence, if the SBR tool operates on a 48kHz AAC signal, the internal sampling rate of the SBR tool will be 96kHz, however, the output signal will be downsampled by the SBR tool to 48kHz.

Note 3: If Parametric Stereo data is present the maximum AAC sampling rate is 24kHz, if Parametric Stereo data is not present the maximum AAC sampling rate is 48kHz.

Note 4: For one or two channels the maximum AAC sampling rate, with SBR present, is 48kHz. For more than two channels the maximum AAC sampling rate, with SBR present, is 24kHz.

Note 5: The PCU/RCU number are given for a decoder operating the LP SBR tool whenever applicable.

With:

Table 1.12 – Levels for the High Efficiency AAC v2 Profile

Level (Note 1)	Max. channels/object	Max. AAC sampling rate, SBR not present [kHz]	Max. AAC sampling rate, SBR present [kHz]	Max. SBR sampling rate [kHz] (in/out)	Max. PCU	Max. RCU	Max. PCU HQ / LP SBR (Note 5)	Max. RCU HQ / LP SBR (Note 5)
1	NA	NA	NA	NA	NA	NA	NA	NA
2	2	48	24	24/48	9	10	9	10
3	2	48	24/48 (Note 3)	48/48 (Note 2)	15	10	15	10
4	5	48	24/48 (Note 4)	48/48 (Note 2)	25	28	20	23
5	5	96	48	48/96	49	28	39	23
6	7	48	24/48 (Note 4)	48/48 (Note 2)	34	37	27	30
7	7	96	48	48/96	67	37	53	30

Note 1: Level 2, 3, 4, 6 and 7 HE AAC v2 Profile decoders implement the baseline version of the parametric stereo tool. A level 5 decoder shall not be limited to the baseline version of the parametric stereo tool.

Note 2: For level 3, level 4 and level 6 decoders, it is mandatory to operate the SBR tool in downsampled mode if the sampling rate of the AAC core is higher than 24kHz. Hence, if the SBR tool operates on a 48kHz AAC signal, the internal sampling rate of the SBR tool will be 96kHz, however, the output signal will be downsampled by the SBR tool to 48kHz.

Note 3: If Parametric Stereo data is present the maximum AAC sampling rate is 24kHz, if Parametric Stereo data is not present the maximum AAC sampling rate is 48kHz.

Note 4: For one or two channels the maximum AAC sampling rate, with SBR present, is 48kHz. For more than two channels the maximum AAC sampling rate, with SBR present, is 24kHz.

Note 5: The PCU/RCU number are given for a decoder operating the LP SBR tool whenever applicable.

In 1.5.2.4 audioProfileLevelIndication

Insert the following new entries into Table 1.14 “audioProfileLevelIndication values” and adapt the “reserved for ISO use” range accordingly:

0x50	AAC Profile	L6
0x51	AAC Profile	L7
0x52	HE-AAC Profile	L6
0x53	HE-AAC Profile	L7
0x54	HE-AACv2 Profile	L6
0x55	HE-AACv2 Profile	L7
0x56	Extended HE-AAC Profile	L6
0x57	Extended HE-AAC Profile	L7
0x58 - 0x7F	reserved for ISO use	-

In 1.5.2.3 after:

"The NA (Not Applicable) levels are introduced to emphasize the hierarchical structure of the AAC Profile and the High Efficiency AAC Profile. Hence, a decoder supporting the High Efficiency AAC Profile at a given level can decode an AAC Profile stream of the same or a lower level. The NA levels are not indicated in the audioProfileLevelIndication table (Table 1.14).

Add:

NOTE: A Level 6 or 7 decoder is not required to decode a Level 5 stream."

In 1.5.2.3 "1.5.2.3 Levels within the profiles",in the AAC, HE-AAC and HE-AACv2 Profile definition after each occurrence of the sentence:

"For the audio object type 2 (AAC LC), mono or stereo mixdown elements are not permitted."

Add:

"For Levels 1 to 5 the height extension element is not permitted."

In 1.6.2.1 extend Table 1.15 "AudioSpecificConfig()"as follows:

Table 1.15 – Syntax of AudioSpecificConfig()

Syntax	No. of bits	Mnemonic
AudioSpecificConfig () {		
…		

saocPresentFlag = -1;
ldmpsPresentFlag = -1;
saocDePresentFlag = -1;
if (audioObjectType == 5 ||
audioObjectType == 29) {		

…		
case 43: saocPresentFlag = 1; **saocPayloadEmbedding**; SaocSpecificConfig(); break;	**1**	**uimsbf**
case 44: ldmpsPresentFlag = 1; **ldsacPayloadEmbedding**; LDSpatialSpecificConfig(); break;	**1**	**uimsbf**
case 45: saocDePresentFlag = 1; **saocDePayloadEmbedding**; SaocDeSpecificConfig(); break;	**1**	**uimsbf**
default: /* reserved */ }		
…		
if (extensionIdentifier == -1 && bits_to_decode() >= 11) { **extensionIdentifier;**	**11**	**bslbf**

}
if (extensionIdentifier == 0x7cb) {
extensionIdentifier = -1;
if (audioObjectType != 43 && bits_to_decode() >= 1) {
saocPresentFlag;
	1	**uimsbf**

if (saocPresentFlag == 1) {
saocPayloadEmbedding = 1;
saocscLen;
	8	**uimsbf**

if (saocscLen == 0xff) { **saocscLenExt;**	**16**	**uimsbf**

saocscLen += saocscLenExt;
}
SaocSpecificConfig();
}
}		

```
    }
    if (extensionIdentifier == -1 && bits_to_decode() >= 11 ) {
        extensionIdentifier;                                    11      bslbf
    }
    if ( extensionIdentifier == 0x7cc ) {
        extensionIdentifier = -1;
        if ( audioObjectType != 44 && bits_to_decode() >= 1 ) {
            ldmpsPresentFlag;                                   1       uimsbf
            if ( ldmpsPresentFlag == 1 ) {
                ldsacPayloadEmbedding = 1;
                ldsscLen;                                       8       uimsbf
                if ( ldsscLen == 0xff ) {
                    ldsscLenExt;                                16      uimsbf
                    ldsscLen += ldsscLenExt;
                }
                LDSpatialSpecificConfig();
            }
        }
    }
    if (extensionIdentifier == -1 && bits_to_decode() >= 11 ) {
        extensionIdentifier;                                    11      bslbf
    }
    if ( extensionIdentifier == 0x7cd ) {
        extensionIdentifier = -1;
        if ( audioObjectType != 45 && bits_to_decode() >= 1 ) {
            saocDePresentFlag;                                  1       uimsbf
            if ( saocDePresentFlag == 1 ) {
                saocDePayloadEmbedding = 1;
                saocDescLen;                                    8       uimsbf
                if ( saocDescLen == 0xff ) {
                    saocDescLenExt;                             16      uimsbf
                    saocDescLen += saocDescLenExt;
                }
                SaocDeSpecificConfig();
            }
        }
    }
}
```


After 1.6.2.1.19 add the new subclause as follows:

1.6.2.1.20 SaocDeSpecificConfig

Defined in ISO/IEC 23003-2:2010/Amd.3.

In 1.6.2.2.1 extend Table 1.17 "Audio Object Types" as follows: