
**Information technology — Coding of
audio-visual objects —**

**Part 3:
Audio**

AMENDMENT 7: SBR enhancements

iTeh STANDARD PREVIEW

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

AMENDEMENT 7

ISO/IEC 14496-3:2009/Amd 7:2018

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Information technology — Coding of audio-visual objects —

Part 3: Audio

AMENDMENT 7: SBR enhancements

1.5.1.2.6

Replace the first sentence with:

The SBR Object contains the SBR-Tool and the MPEG-4 SBR Enhancements as signalled in the SBR extension element (bs_extension_id== EXTENSION_ID_ESBR) of Annex 8.A and can be combined with the audio object types indicated in Table 1.2. If a decoder detects and supports this SBR extension element, the decoder shall process the MPEG-4 SBR Enhancements.

1.5.2.2

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In Table 1.4, update the row for Object Type SBR as follows:

SBR	fs = 24/48 kHz (in/out) (SBR tool)	3	2.5	1)
	fs = 24/48 kHz (in/out) (eSBR tool)	4.5	3	1)
	fs = 24/48 kHz (in/out) (Low Power SBR tool)	2	1.5	1)
	fs = 48/48 kHz (in/out) (Down Sampled SBR tool)	4.5	2.5	1)
	fs = 48/48 kHz (in/out) (Low Power Down Sampled SBR tool)	3	1.5	1)

1.5.2.3

Replace Table 1.11 with the following:

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	11	11	7	8
3	2	48	48	48/48 ^a	17	11	12	8
4	5	48	24/48 ^b	48/48 ^a	30	31	20	23
5	5	96	48	48/96	60	33	39	23
6	7	48	24/48 ^b	48/48 ^a	42	41	27	30
7	7	96	48	48/96	82	44	53	30

^a 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 24 kHz. Hence, if the SBR tool operates on a 48 kHz AAC signal, the internal sampling rate of the SBR tool will be 96 kHz, however, the output signal will be downsampled by the SBR tool to 48 kHz.

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

Replace Table 1.12 with the following:

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Level ^a	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 ^e	Max. RCU HQ / LP SBR ^e
1	NA	NA	NA	NA	NA	NA	NA	NA
2	2	48	24	24/48	11	11	9	10
3	2	48	24/48 ^c	48/48 ^b	17	11	15	10
4	5	48	24/48 ^d	48/48 ^b	30	31	20	23
5	5	96	48	48/96	60	33	39	23
6	7	48	24/48 ^d	48/48 ^b	42	41	27	30
7	7	96	48	48/96	82	44	53	30

^a 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.

^b 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 24 kHz. Hence, if the SBR tool operates on a 48 kHz AAC signal, the internal sampling rate of the SBR tool will be 96 kHz, however, the output signal will be downsampled by the SBR tool to 48 kHz.

^c If Parametric Stereo data is present the maximum AAC sampling rate is 24 kHz, if Parametric Stereo data is not present the maximum AAC sampling rate is 48 kHz.

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

^e The PCU/RCU number are given for a decoder operating the LP SBR tool whenever applicable.

1.6.7.2

Replace Table 1.27 with the following:

Value of <i>n</i>	Additional delay ^a	Decoder operation mode
1	0	A) All operation modes not listed elsewhere in this table.
963	962	B1) HE-AAC or HE-AAC v2 decoder with SBR operated in dual-rate mode; decoding HE-AAC or HE-AAC v2 compressed audio.
482	481	B2) Same as B1), but with SBR operated in downsampled mode.
3011	3010	B3) Same as B1), but with SBR Enhancements enabled.

^a The delay introduced by the post-processing is given in number of samples (per audio channel) at the output sample rate for the given decoder operation mode.

4.5.2.8.1

Replace Table 4.112 with the following:

bs_extension_id	Meaning
0	reserved
1	reserved
2	EXTENSION_ID_PS ^a
3	EXTENSION_ID_ESBR ^a

^a See subclause 8.A.

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After Table 4.119 add the following:

esbr_fill_bits Fill bits to enable correct parsing of the sbr_extension() element.

Annex 8.A

Replace the Annex title with:

Combination of the SBR tool with the parametric stereo tool and SBR Enhancements

8.A.1, paragraph 2

At the end of paragraph 2 add a new paragraph:

In addition, the harmonic transposers and SBR pre-processing as defined in ISO/IEC 23003-3 may be used in combination with the SBR tool as defined in 4.6.18. The bitstream element esbr_data() as defined in 8.A.2 conveys the information needed by these tools and is carried in the sbr_extension() container of the SBR bitstream.

8.A.2

Replace the first sentence with:

The bitstream element `ps_data()` as defined in 8.4.2, and the bitstream element `esbr_data()` as defined in Table 8.A.2, are carried in the `sbr_extension()` container (see Table 8.A.1 below) provided by the SBR bitstream defined in 4.4.2.8. The semantics of the `bs_extension_id` field are given in Table 4.105 “`bs_extension_id`”.

Replace Table 8.A.1 with the following:

Syntax	No. of bits	Mnemonic
<pre>sbr_extension(bs_extension_id, num_bits_left) { switch (bs_extension_id) { case EXTENSION_ID_PS: num_bits_left -= ps_data(); break; case EXTENSION_ID_ESBR: num_bits_left -= esbr_data(); break; default: bs_fill_bits; num_bits_left = 0; break; } }</pre>	<p style="text-align: center;">iTeh STANDARD PREVIEW (standards.iteh.ai)</p> <p style="text-align: center;">https://standards.iteh.ai/catalog/standards/sist/5709a79a-879e-4688-b437-fbccbe477a77/iso-iec-14496-3-2009-amd-7-2018</p>	<p>a</p> <p>b</p> <p>num_bits_left bslbf</p>
<p>a <code>ps_data()</code> returns the number of bits read.</p> <p>b <code>esbr_data()</code> returns the number of bits read.</p>		

After Table 8.A.1 add a new table:

Table 8.A.2 — Syntax of `esbr_data()`

Syntax	No. of bits	Mnemonic
<code>esbr_data(id_aac, bs_coupling)</code>		
{		
<code>num_bits_esbr = 1</code>		
<code>bs_sbr_preprocessing;</code>	1	uimsbf
if (<code>id_aac == ID_SCE</code>) {		
<code>num_bits_esbr += 1</code>		
if (<code>sbrPatchingMode[0] == 0</code>) {	1	uimsbf
<code>num_bits_esbr += 2</code>		
<code>sbrOversamplingFlag[0];</code>	1	uimsbf
if (<code>sbrPitchInBinsFlag[0]</code>) {	1	uimsbf
<code>num_bits_esbr += 7</code>		
<code>sbrPitchInBins[0];</code>	7	uimsbf
} else		
<code>sbrPitchInBins[0] = 0;</code>		
} else {		
<code>sbrOversamplingFlag[0] = 0;</code>		
<code>sbrPitchInBins[0] = 0;</code>		
}		
} else if (<code>id_aac == ID_CPE</code>) {		
If (<code>bs_coupling</code>) {		
<code>num_bits_esbr += 1</code>		
if (<code>sbrPatchingMode[0,1] == 0</code>) {	1	uimsbf
<code>num_bits_esbr += 2</code>		
<code>sbrOversamplingFlag[0,1];</code>	1	uimsbf
if (<code>sbrPitchInBinsFlag[0,1]</code>) {	1	uimsbf
<code>num_bits_esbr += 7</code>		
<code>sbrPitchInBins[0,1];</code>	7	uimsbf
} else		
<code>sbrPitchInBins[0,1] = 0;</code>		
} else {		
<code>sbrOversamplingFlag[0,1] = 0;</code>		
<code>sbrPitchInBins[0,1] = 0;</code>		
}		
} else { /* <code>bs_coupling == 0</code> */		
<code>num_bits_esbr += 1</code>		
if (<code>sbrPatchingMode[0] == 0</code>) {	1	uimsbf
<code>num_bits_esbr += 2</code>		
<code>sbrOversamplingFlag[0];</code>	1	uimsbf
if (<code>sbrPitchInBinsFlag[0]</code>) {	1	uimsbf
<code>num_bits_esbr += 7</code>		

NOTE `bs_sbr_preprocessing` is defined in ISO/IEC 23003-3:2012, 6.2.12. `sbrPatchingMode[ch]`, `sbrOversamplingFlag[ch]`, `sbrPitchInBinsFlag[ch]` and `sbrPitchInBins[ch]` are defined in ISO/IEC 23003-3:2012, 7.5.